

## Original Article

# Effects of chlorquinaldol and promestriene on cervical erosion and serum IL-6 and IL-8 levels

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Received April 30, 2019; Accepted June 19, 2019; Epub April 15, 2020; Published April 30, 2020

**Abstract:** Objective: To investigate the effects of chlorquinaldol and promestriene on cervical erosion and serum IL-6 and IL-8 levels. Methods: A prospective analysis of 96 patients with cervical erosion was carried out. They were randomly divided into group A (n=48) who were treated with microwave therapy; group B (n=48) who took 0.2 g chlorquinaldol and 10 mg promestriene for 14 days in addition to the treatment given in group A. The changes of IL-6 and IL-8 expression before and after treatment were observed. The total response rate of the two groups was measured. The changes of QOL-74 scores before and after treatment were quantified in the two groups. The end time of vaginal bleeding and the disappearance time of vaginal discharge were observed. Results: The response rate of group A was significantly lower than that of group B ( $P<0.05$ ). IL-6 and IL-8 concentrations in group A were significantly lower than those in group B ( $P<0.05$ ). The QOL-74 scores of the two groups increased remarkably after treatment, and group B showed significantly higher scores than group A ( $P<0.05$ ). The recovery of vaginal bleeding and disappearance of vaginal discharge in group A were slower than those in group B. Conclusion: Chlorquinaldol and promestriene vaginal tablets combined with microwave therapy can effectively improve the pathological changes and increase the response rate in patients with cervical erosion. It also can effectively improve the expression of IL-6 and IL-8 in serum.

**Keywords:** Chlorquinaldol and promestriene vaginal tablets, cervical erosion, IL-6, IL-8

## Introduction

Studies have shown that female genital tract infection could be life-threatening for some female patients [1]. In the clinic, chronic cervicitis is the most common chronic inflammatory disease in gynecology, which is mainly characterized by changes of the cervical vaginal at the external cervix, which is clinically referred to as cervical erosion [2]. Cervical erosion can be caused by physiological changes and/or pathological changes. The pathological changes are cervical columnar epithelium congestion, edema, etc., which needs relevant treatment to improve the condition. The physiological disease is the displacement of the squamous columnar junction caused by changes in estrogen. It is more common in adolescents, reproductive-aged patients and patients taking oral contraceptives [3, 4]. At present, patients with pathological cervical erosion are clinically treated with microwave therapy. Microwave therapy

focuses radiation directionally with high-frequency electromagnetic waves, to produce a local high fever. It will coagulate and denature the lesions, causing the lesioned tissue to fall off [5]. However, there are certain shortcomings in this treatment. Postoperative patients will have more vaginal secretion and bloody vaginal secretions will appear after crusting, which can increase anxiety and depression [6].

Chlorquinaldol and promestriene vaginal tablets are a compound preparation for treating abnormal vaginal discharge caused by various infectious diseases [7]. As a member of broad-spectrum antibiotics, chlorquinaldol is a potent contact bactericidal drug for bacterial infections in the reproductive organs [8]. Promestriene has a unique bimolecular structure, which can directly act on the vaginal mucosa of patients after vaginal administration. It can effectively avoid contact with skin and other cells, reduce the occurrence of systemic stress hor-

monal responses, and accelerate the production of lactobacilli. It can promote the recovery of the vaginal environment in cervical erosion, thereby reducing the risk of reinfection [9].

As an important family of inflammatory factors in the human body, the interleukin family has a very important expression when inflammatory reaction occurs in the body [10]. IL-6 is the most important pro-inflammatory cytokine in the body. It is low in normal conditions. It increases rapidly when body's inflammatory response, autoimmune disease and malignant tumors occur [11]. As a multi-source cytokine, IL-8 is widely distributed in the body and can be produced by monocytes, macrophages, vascular endothelial cells, and lymphocytes that are involved in the innate immune response. IL-8 is widely distributed in the body, which can be produced by monocytes, macrophages, vascular endothelial cells and lymphocytes [12].

Therefore, this study provides a reference for clinical treatment by exploring the effects of chlorquinaldol and promestriene vaginal tablets combined with microwave therapy on the improvement of pathological cervical erosion, and on the expression of IL-6 and IL-8 in serum.

### Method and materials

Prospective analysis of 96 patients with cervical erosion was carried out in our hospital. There were 48 patients in group A; the age range was 24-58; the average age was  $36.4 \pm 4.5$  years; there were 13 cases of grade I erosion, 14 cases of grade II erosion, 21 cases of grade III erosion, 16 cases of simple type, 22 cases of granular type and 10 cases of mastoid type. There were 48 patients in group B; the age range was 26~58 years old; the average age was  $37.5 \pm 5.1$  years old; there were 15 cases of grade I erosion, 17 cases of grade II erosion, 16 cases of grade III erosion, 17 cases of simple type, 20 cases of granular type and 11 cases of mastoid type. Inclusion criteria: All patients were >18 years of age; all patients were diagnosed with pathological changes in cervical erosion [3]. Exclusion criteria: Patients during a lactating period; patients with a history of cervical microwave therapy; patients without cervical epithelial neoplasia, and patients with cervical cancer. The patients with other inflammatory diseases other than cervical erosion. Patients that have congenital immunodeficien-

cy. Patients that have severe heart, liver and kidney dysfunction. Patients that have acute myocardial infarction or acute stroke within the past 3 months. Patients that are allergic to the drugs used in this study. Patients who used anti-inflammatory drugs recently.

The study was approved by the Shanxi Provincial Hospital of traditional Chinese Medicine ethics committee and all participants signed an informed consent.

### Drugs and reagents

IL-6 and IL-8 EILSA kit (Shanghai Biyuntian Biotechnology Co., Ltd., PI330, PI640) chlorquinaldol and promestriene vaginal tablets (China Beijing Silian Pharmaceutical Co., Ltd., specifications: (0.2 g: 10 mg) × 6 tablets/box, GYZZ H20065500).

Furancillin powder (Wuhan Jiu'an Pharmaceutical Co., Ltd., GYZZ H42020920).

### Treatment method

Patients in group A were treated with cervical microwave one week after menstruation. The specific methods are as follows: bladder was emptied and the patient was placed in lithotomy position. The cervix was wiped with iodophor, and the probe was used to locate the patient's lesion area after adjusting the microwave instrument. An electric burn (in a clockwise direction) was performed to observe changes in the tissue and stop the operation when the tissue solidifies to yellow-white. After the operation, a small amount of nitrofurazone powder was sprayed on the surface of the cervix, and a cotton ball was placed. After 12 hours, the patient took the cotton ball out by herself. Patients in group B were treated with chlorquinaldol and promestriene vaginal tablets in addition to the above treatment [13, 14]. The methods were as follows: chlorquinaldol and promestriene vaginal tablets were placed in the posterior fornix of the patient's vagina for 1 d/time, 1 time/tablet and a total of 14 days treatment. The patient was instructed to place the tablets by themselves.

### IL-6 and IL-8 detection methods

IL-6 and IL-8 were detected by ELISA as follows: the venous blood was collected the next morn-

**Table 1.** Evaluation criteria for efficacy

Curative effect	Standard
Cure	Vaginal bleeding and leucorrhea disappeared, vaginal examination showed smooth cervix, and all erosive sites returned to normal.
Excellence	The increase in vaginal bleeding and leucorrhea was significantly improved, with more than 2/3 of the patient's erosive area recovered.
Effective	Vaginal bleeding and leucorrhea were partly improved, and the area of erosion was smaller than before.
Ineffective	All symptoms were improved, and no progress occurred.

**Table 2.** Comparison of clinical data between two groups

Factor	A group (n=48)	B group (n=48)	$\chi^2/t/Z$ value	P value
Age (years)	36.4±4.5	37.5±5.1	1.120	0.265
BMI (kg/m <sup>2</sup> )	23.6±1.6	23.8±2.1	0.525	0.601
Erosion degree				
I level	13 (27.08)	15 (31.25)	-0.892	0.732
II level	14 (29.17)	17 (35.42)		
III level	21 (43.75)	16 (33.33)		
Erosion type				
Simple type	16 (33.33)	17 (35.42)	0.173	0.917
Granular type	22 (48.83)	20 (41.67)		
Mastoid type	10 (20.83)	11 (22.91)		
Gravidity				
≥1 times	33 (68.75)	32 (66.67)	0.048	0.827
<1 times	15 (31.25)	16 (33.33)		
Parity				
≥1 times	28 (58.33)	30 (62.50)	0.174	0.676
<1 times	20 (41.67)	18 (37.50)		
Domicile				
City	26 (54.17)	32 (66.67)	1.568	0.210
Village	22 (48.83)	16 (33.33)		
Marital status				
Married	30 (62.50)	32 (66.67)	0.246	0.884
Unmarried	12 (25.00)	10 (20.83)		
Dissociation	6 (12.50)	6 (12.50)		
Smoking history				
Yes	11 (22.91)	13 (27.08)	0.222	0.637
No	37 (77.09)	35 (72.92)		

ing, centrifuged at 3000 rpm for 10 min and collected the serum. The collected serum was separately added to a blank microwell of 50 µl standard solution with different concentrations. The blank control well was mixed with 50 µl distilled water and 50 µL antibody; the remaining microwells were first added with 40 µl sample and then 10 µl biotin-labeled antibody.

Subsequently, the plate was incubated at 37°C for 30 min. The wells were washed with liquid for 30 seconds and ensured to be full but not overflowing. They were then patted dry for 5 times. Then 50 µl of the enzyme standard solution was added to each well. The plate was incubated at 37°C for 60 min and washed 5 times. Horseradish peroxidase 100 µl/well was added to label the plate, it was incubated at 37°C for 15 min in the dark. Then 100 µl/well chromogenic substrate TMB was added, incubated at room temperature for 20 min in the dark, and finally 50 µl/well of the stop solution was added. The ELISA was used within 15 min to determine the maximum absorption wavelength at 450 nm. Three sets of duplicate wells were prepared and the experiment was repeated 3 times.

#### Outcome measures

At 14 days after treatment, all patients were followed up with blood tests and their GQOL-74 score was evaluated.

Main outcome measures: The changes of IL-6 and IL-8 expression in the two groups before treatment and at 14 days after treatment were observed. The total effective rate of treatment in the two groups was observed. The criteria were shown in **Table 1**.

Secondary outcome measures: The changes of GQOL-74 scores [15] before treatment and at 14 days after treatment were observed in the two groups. The higher the score was, the higher the quality of life of the patients. The end

**Table 3.** Comparison of response rate in patients

Group	Cure	Excellence	Effective	Of no avail	Z value	P value
A group (n=48)	24 (57.14)	6 (14.29)	7 (16.67)	5 (11.90)	-2.192	0.033
B group (n=48)	36 (75.00)	8 (16.67)	3 (6.25)	1 (2.08)		

**Table 4.** Changes of IL-6 and IL-8 before and after treatment (pg/mL)

Group	Pretherapy		Post-treatment	
	IL-6	IL-8	IL-6	IL-8
A group (n=48)	64.59±7.12	7.35±2.10	41.36±3.59*	3.12±1.50*
B group (n=48)	64.61±5.50	7.62±1.77	32.09±4.19*	1.69±0.89*
t value	0.015	0.681	11.640	5.680
P value	0.988	0.498	<0.001	<0.001

Note: \*shows that there is a difference between the two groups after treatment ( $P<0.05$ ).

**Table 5.** Comparison of IL-6 and IL-8 difference between two groups (pg/mL)

Detection index	A group (n=48)	B group (n=48)	t value	P value
IL-6	23.24±8.09	32.40±6.57	6.089	<0.001
IL-8	4.24±2.45	5.93±1.80	3.851	<0.001

time of vaginal bleeding and the disappearance time of vaginal discharge were observed.

#### Statistical analysis

In this study, the data collected in this study was statistically analyzed by SPSS 20.0 software package, and the tables were drawn by GraphPad Prism 7 software. The enumeration data was expressed by rate (%), was tested by chi-square and indicated by  $\chi^2$ ; the ranked data was analyzed with rank sum test, indicated by Z. The measurement data was expressed by mean  $\pm$  standard deviation (mean  $\pm$  SD). An independent sample t-test was used between two groups. The change before and after treatment was analyzed by a paired t-test and expressed as t.  $P<0.05$  indicated that there was a statistical difference.

#### Results

##### Comparison of baseline clinical data between two groups of patients

We compared the clinical data between two groups of patients and found that there were no statistical differences in age, BMI, erosion degree, erosion type, pregnancy time, parity, place of residence, marital status, and smoking

history between the two groups ( $P>0.05$ ). The data of this study was comparable (Table 2).

##### Comparison of re-response rate between two groups of patients

We evaluated the re-response rate of the two groups of patients and found that in group A, 24 cases were cured, 6 were markedly effective, 7 were effective, and 5 were ineffective. In group B, 36 cases were cured in group B, 8 were markedly effective, 3 were effective, and 1 was ineffective. The clinical efficacy of group A was

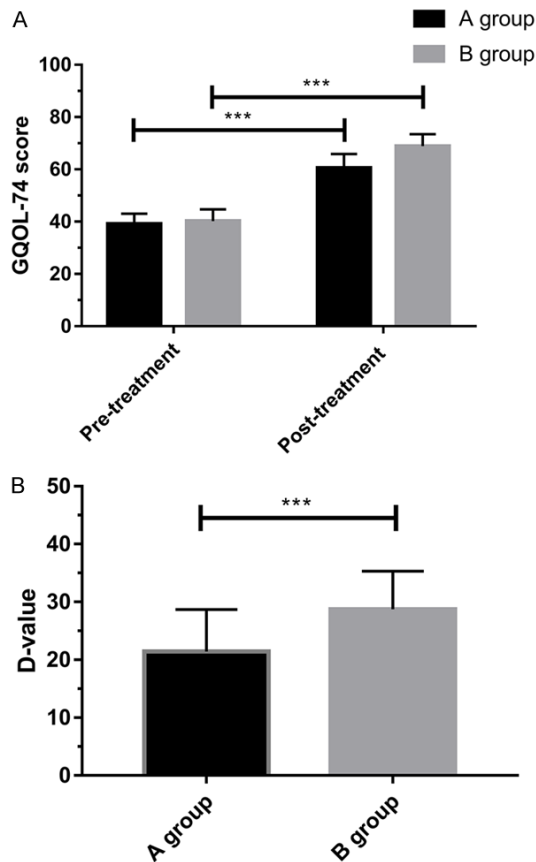
significantly lower than that of group B. The difference was statistically significant ( $Z=-2.129$ ,  $P=0.033$ ) (Table 3).

##### Changes of IL-6 and IL-8 between two groups before and after treatment

We tested the expression of IL-6 and IL-8 in serum of the two groups before and after treatment. There was no difference in the expressions of IL-6 and IL-8 before treatment between the two groups (all  $P>0.05$ ). The expressions of IL-6 and IL-8 in the patients after treatment were significantly lower than those before treatment ( $t_{A\ IL-6}=20.184$ ,  $P_{A\ IL-6}=0.000$ ,  $t_{B\ IL-6}=34.174$ ,  $P_{B\ IL-6}=0.000$ ;  $t_{A\ IL-8}=11.359$ ,  $P_{A\ IL-8}=0.000$ ,  $t_{B\ IL-8}=22.786$ ,  $P_{B\ IL-8}=0.000$ ). The difference in value changes of IL-6 and IL-8 in group A was significantly lower than that in group B. There was statistical difference ( $P<0.05$ ) (Tables 4 and 5).

##### GQOL-74 score changes before and after treatment between two groups; the end time of vaginal bleeding and the disappearance time of vaginal discharge

We compared the GQOL-74 scores between two groups and found there was no significant difference in the GQOL-74 scores between two

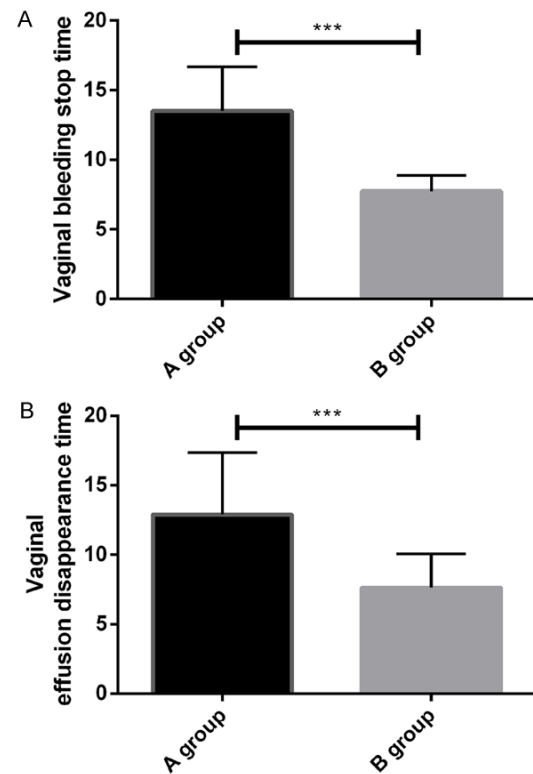


**Figure 1.** Changes in GQOL-74 scores before and after treatment in both groups of patients. A. The GQOL-74 scores in both groups after treatment were significantly higher than those before treatment. B. The difference value of GQOL-74 scores in group B before and after treatment was significantly higher than that in group A. \*\*\* $P < 0.001$ .

groups before treatment ( $P < 0.05$ ). However, the GQOL-74 scores between two groups after treatment were increased remarkably ( $t_A = 20.184$ ,  $P_A = 0.000$ ;  $t_B = 30.136$ ,  $P_B = 0.000$ ). The difference in value of GQOL-74 score in group A was significantly lower than that in group B ( $t = 4.623$ ,  $P = 0.001$ ) (Figure 1). Subsequently, the end time of vaginal bleeding and the disappearance time of vaginal discharge in group A were slower than those in group B, and the difference was statistically significant ( $t_{\text{the stopping time of vaginal bleeding}} = 11.750$ ,  $P_{\text{the end time of vaginal bleeding}} = 0.000$ ;  $t_{\text{the disappearance time of vaginal discharge}} = 7.083$ ,  $P_{\text{the disappearance time of vaginal discharge}} = 0.000$ ) (Figure 2).

## Discussions

At present, cervical erosion is not a disease term in western obstetrics and gynecology medicine. It is considered as a physiological



**Figure 2.** The end time of vaginal bleeding and the disappearance time of vaginal discharge after treatment in both groups. A. It was found that the end time of vaginal bleeding in group A was significantly slower than that in group B. B. The disappearance time of vaginal discharge in group A were slower than that in group B. \*\*\* $P < 0.001$ .

changing process of the female cervix [16]. However, In China, studies found that cervical erosion is sometimes associated with a physiological disease [17]. Some studies have shown that [4] the cervix morphology can be restored to the preoperative natural state after treatment with Leep knife. The therapeutic effect of Leep knife is slightly better than microwave therapy which is more acceptable due to low price.

However, microwave therapy also has certain limitations. Patients may have cervical scars after surgery. There were large amounts of intraoperative blood loss and bloody vaginal secretions, which are the primary problems that clinicians need to solve [18]. The chlorquinaldol and promestriene vaginal tablets are a compound synthetic preparation. Chlorquinaldol can be gradually released in the vagina and won't be excreted by metabolism. It has a significant therapeutic effect on common gynecological genital infections. As a kind of asym-



metric estradiol dioxide, it can directly act on the vaginal epithelial cells in the lesion area without affecting metabolism. It only reacts in the affected area. It won't produce systemic hormonal effects. It can effectively maintain the vaginal environment, promote the maturation of epithelial cells and avoid the occurrence of infection [19]. In this study, both groups of patients were treated by microwave therapy. Patients in group B were treated with chlorquinaldol and promestriene vaginal tablets in addition to the microwave treatment. The clinical efficacy of group B was clearly better than that of group A. By observing the patient's end time of vaginal bleeding and disappearance time of vaginal discharge, we also found that the recovery time of the two indicators in group B was significantly reduced, speeding up the patient's postoperative recovery. The main reason was that the local application had accelerated the recovery of the patient's postoperative vaginal environment and reduced the infection rate of the patient. After the combination treatment, it can promote the epithelial detachment of necrosis in the surgical erosion area, and provide favorable growth conditions for the new squamous epithelium. Therefore, it effectively improves the local edema and re-congestion of the patient after surgery [20]. We statistically analyzed the GQOL-74 scores of patients before and after treatment and found that both methods have significantly improved the GQOL-74 score of patients. The difference in value of GQOL-74 score in group B before and after treatment was significantly higher than that in group A, indicating that the combination therapy also significantly improved the quality of life.

In this study, we also detected the expression of IL-6 and IL-8 in patients before and after treatment. Interleukin family is an important family of inflammatory factors in the human body. As a classical inflammatory factor, IL-6 is widely present in the human body. It is lowly expressed normally. Its expression will rise rapidly by activated T cells and fibroblasts when inflammation occurs. As an important chemokine, IL-8 can be regulated by neutrophil activation and migration, and plays an important role in the occurrence and development of inflammatory reactions [21, 22]. The expression of IL-6 and IL-8 in the two groups was significantly improved over that before treatment. The difference in value of IL-6 and IL-8 in group B before and after treatment was significantly better than that in group A, which indicated that the combination treatment can effective-

ly improve the expression of IL-6 and IL-8 in serum. Before this, there were no studies on the expression of IL-6 and IL-8 in serum that can be altered by chlorquinaldol and promestriene vaginal tablets combined with microwave therapy. We first demonstrated the effect of chlorquinaldol and promestriene vaginal tablets combined with microwave therapy on IL-6 and IL-8 in patients with pathological cervical erosion. We hypothesized that the incidence of postoperative bacterial infections can be reduced by combined treatment. The stimulation to neutrophils, T cells and fibroblasts were also decreased. The expression of IL-6 and IL-8 in patients was finally improved, promoting patient's condition [23, 24]. Some studies have shown that [25] IL-6 and IL-8 expression in the reproductive tract is closely related to the changes of genital flora, which indicates that the expression of IL-6 and IL-8 is expected to become a potential prognostic indicator of pathological cervical erosion.

In this study, we initially demonstrated the clinical efficacy of chlorquinaldol and promestriene vaginal tablets in the treatment of pathological cervical erosion, and the changes of IL-6 and IL-8 during the treatment. This study still has certain limitations. Long-time follow-up were not performed to observe long-term effects. Dynamic evaluation of IL-10 changes during therapy is also important as it reflect the constant changes trend. We also did not test with more dose options. We hope to conduct more in-depth studies in the future to supplement the results of this study.

In summary, chlorquinaldol and promestriene vaginal tablets combined with microwave therapy can effectively improve the clinical efficacy of pathological cervical erosion and the expression of IL-6 and IL-8 in serum. It is suitable for wide promotion in clinic.

### Disclosure of conflict of interest

None.

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### References

- [1] Sheldon IM, Owens SE and Turner ML. Innate immunity and the sensing of infection, dam-

- age and danger in the female genital tract. *J Reprod Immunol* 2017; 119: 67-73.
- [2] Zhang L. Evaluation of the effect of combined traditional Chinese and western medicine on cervical erosion. *J Integr Med* 2016; 5.
- [3] Patil P and Sharma P. Colposcopic evaluation of cervical erosion in symptomatic women. *Int J Reprod Contracept Obstet Gynecol* 2017; 6: 2207-2211.
- [4] Li T. Effect of LEEP on the cervical microcirculation and HPV in patients with moderate and severe cervical erosion. *Journal of Hainan Medical University* 2016; 22: 57-59.
- [5] Tang X, Gao Z, Li Y, Yu J and Li X. Efficacy and safety of focused ultrasound versus microwave therapy for cervical ectopy: a meta-analysis. *J Evid Based Med* 2015; 8: 61-74.
- [6] Liu Y, Yang K, Wu T, Roberts H, Li J, Tian J, Ma B, Tan J and Zhang P. Microwave therapy for cervical ectropion. *Cochrane Database Syst Rev* 2007; CD006227.
- [7] Dongmei J and Hong W. Clinical observation of vaginal administration of lactobacillus combined with chlorquinaldol-promestriene for senile patients with atrophic vaginitis. *China Pharmacy* 2016; 27: 4968-4970.
- [8] Wang H, Gu Q and Yu ZY. Analysis of the rationality of drug use for patients with pelvic inflammatory disease in gynecological clinic of a hospital. *Evaluation and Analysis of Drug-Use in Hospitals of China* 2013; 3: 010.
- [9] Xiang W. The effect of vaginal tablets of chlorquinaldol-promestriene treating atrophic vaginitis. *Seek Medical and Ask the Medicine* 2012; 2: 423.
- [10] He JZ, Wu YP and Li C. Effect of Xiaoyao pill on SOD, MDA, interleukin family and clinical efficacy in patients with pelvic inflammation. *Chinese Journal of Biochemical Pharmaceutics* 2015; 35: 22-24.
- [11] Kishimoto T and Tanaka T. Interleukin 6. *Encyclopedia of Inflammatory Diseases* 2015; 1-8.
- [12] Volpin G, Cohen M, Assaf M, Meir T, Katz R and Pollack S. Cytokine levels (IL-4, IL-6, IL-8 and TGFβ) as potential biomarkers of systemic inflammatory response in trauma patients. *Int Orthop* 2014; 38: 1303-1309.
- [13] Yang ZP and Wu X. Effects of LEEP combined with interferon suppository and baofukang suppository on treating cervical erosion. *Chinese Journal of Experimental Traditional Medical Formulae* 2011.
- [14] Ye DM, Xu LM and Lu RL. Clinical observation on laparoscopic ovarian electrocauterization combined with cycle treatment of traditional chinese medicine for type phlegm-damp refractory polycystic ovary syndrome. *Journal of Guangzhou University of Traditional Chinese Medicine* 2007; 24: 445-448.
- [15] Chen X, Lu W, Zheng W, Gu K, Matthews CE, Chen Z, Zheng Y and Shu XO. Exercise after diagnosis of breast cancer in association with survival. *Cancer Prev Res (Phila)* 2011; 4: 1409-18.
- [16] Zhongxing S, Guilan L, Jia C, Guangqin Z, Xiaoping T, Xianfeng Z and Dongyun Y. Therapeutic effects of traditional Chinese medicine in patients with symptomatic cervical ectopy. *Complement Ther Med* 2015; 23: 816-820.
- [17] Yachun H and Jin Y. Effect of Baofukang suppository and policresulen in the treatment of cervical erosion. *Chinese Journal of Primary Medicine and Pharmacy* 2015; 3107-3109.
- [18] Wen D and Lan D. The newly diagnosis and treatment strategy for the chronic cervicitis. *Chinese Journal of Practical Gynecology and Obstetrics* 2008; 1: 002.
- [19] Ying D, Zhao C, Zhang Y and Liu Y. Comparison of therapeutic efficacy and safety between chlorquinaldol-promestriene and miconazole nitrate for simple vulvovaginal candidiasis. *China Pharmacy* 2017; 28: 3791-3793.
- [20] Li YD, Zhang QZ and Luo XZ. Therapeutic effect of zicao oii combined with microwave radiation for middle-and severe-degree cervical erosion: an observation of 105 cases. *Journal of New Chinese Medicine* 2008; 10: 037.
- [21] Russo RC, Garcia CC, Teixeira MM and Amaral FA. The CXCL8/IL-8 chemokine family and its receptors in inflammatory diseases. *Expert Rev Clin Immunol* 2014; 10: 593-619.
- [22] Joseph PR, Mosier PD, Desai UR and Rajarathnam K. Solution NMR characterization of chemokine CXCL8/IL-8 monomer and dimer binding to glycosaminoglycans: structural plasticity mediates differential binding interactions. *Biochem J* 2015; 472: 121-33.
- [23] Hunter CA and Jones SA. IL-6 as a keystone cytokine in health and disease. *Nat Immunol* 2015; 16: 448-457.
- [24] Mitchell CM, Haick A, Nkwopara E, Garcia R, Rendi M, Agnew K, Fredricks DN and Eschenbach D. Colonization of the upper genital tract by vaginal bacterial species in nonpregnant women. *Am J Obstet Gynecol* 2015; 212: 611, e1-9.
- [25] Santos-Greatti MMV, da Silva MG, Ferreira CST and Marconi C. Cervicovaginal cytokines, sialidase activity and bacterial load in reproductive-aged women with intermediate vaginal flora. *J Reprod Immunol* 2016; 118: 36-41.