

# *Clinical Application of “Bombyx Batryticatus-Cicada Slough” Pair in IgA Nephropathy*

Lina Duan<sup>1</sup>, Huiling Jing<sup>2,\*</sup>, Jiabi Song<sup>1</sup>, Yu Ren<sup>1</sup>, Weiyang Wang<sup>2</sup>

<sup>1</sup>Shaanxi University of Chinese Medicine, Xi'an, Shaanxi, 712046, China

<sup>2</sup>Xi'an Hospital of Traditional Chinese Medicine, Xi'an, Shaanxi, 712016, China

\*Corresponding author

**Keywords:** Drug pair, Bombyx batryticatus, Cicada slough, IgA nephropathy, Pharmacological action

**Abstract:** Objective: To explore the pathological mechanism and clinical therapeutic effect of “Bombyx Batryticatus-Cicada Slough” pair on IgA nephropathy. Methods: Summarizing and discussing the relationship between IgA nephropathy and pharmacological effects of Bombyx batryticatus and Cicada Slough by consulting the related literatures about TCM treatment of IgA nephropathy in recent ten years. Conclusion: Combining with the modern pharmacology of traditional Chinese medicine, it is concluded that Bombyx Batryticatus and Cicada Slough have potential advantages in the treatment of Ig A nephropathy from the aspects of drug function, nature, taste, meridian tropism, genus and disease location of the drug pair.

## 1. Introduction

Drug pair, is a relatively fixed compatibility of two drugs in clinic. Although the medicine taste is less, it is not simply added, but the core embodiment of syndrome differentiation and treatment according to the key links of pathogenesis, which can play the role of attenuation and efficiency, mutual coordination and mutual restriction, and improve the treatment effect <sup>[1]</sup>. Bombyx batryticatus-cicada slough, as a classic pair medicine, is widely used, and can treat convulsions <sup>[2]</sup>, sore throat, itching skin <sup>[3]</sup> and other diseases.

IgA nephropathy, belongs to the categories of “turbid urine”, “edema” and “blood urine” in TCM. It is a common primary glomerular disease in clinic, showing proteinuria, hematuria, edema and other symptoms and it is one of the high risk factors of end-stage renal failure. There are many causes of this disease. Clinically, IgA N is mainly diagnosed by detecting the glycosylation defect level of IgA1 molecule in patients' serum or the specific antibody against glycosyl deletion IgA1 molecule, and combining the renal pathological results and symptoms <sup>[4]</sup>. Western medicine mainly uses RAS blockers, glucocorticoids, immunosuppressants as the main treatment methods <sup>[5]</sup>. However, there are different advantages and disadvantages in clinical efficacy, and it is easy to have toxic and side effects of different degrees. TCM believes that its nature is characterized by deficiency of lung, spleen and kidney, while deficiency of lung, spleen and kidney is the main factor, while dampness, heat, toxin and blood stasis are the pathogens of dampness, heat, poison and blood stasis, which hurt kidney internally. Therefore, the TCM treatment principle of IgA N is to benefit

lung, tonify kidney and spleen, clear heat, promote diuresis, detoxify and remove blood stasis<sup>[6]</sup>. In this paper, the potential advantages in the treatment of IgA nephropathy were discussed by the clinical follow-up experience and consulting the related literatures of Bombyx batryticatus and cicada slough in recent ten years.

## 2. Methodology

### 2.1 The Source of Drug Pairs on Bombyx Batryticatus-Cicada

The compatibility of Bombyx batryticatus and Cicada slough was rare before Song Dynasty, among which Xiaofeng Powder of Taiping Huimin Heji Bureau Prescription was the most well-known, and the two drugs assisted Schizonepeta tenuifolia and Notopterygium root to strengthen the effect of dispelling wind<sup>[7]</sup>. Gong Tingxian's "Rejuvenation of All Diseases" in Ming Dynasty stated in Neifu Xianfang: "Treat swollen head disease and frog plague. Bombyx batryticatus two and a half dollars, turmeric two and a half dollars, cicada slough two and a half dollars, rhubarb four and a half dollars, and the upper part is fine powder."<sup>[8]</sup> After the Qing Dynasty, Yang Lishan, a febrile disease scientist, inherited the upper part and the compensation powder, and composed the upper four medicines into Shengjiang Powder, which is mainly used for treating heat toxin, fiery stagnation or diffuse triple energizer. Moreover, some studies have found that the core drugs for treating plague in Yang Lishan are cicada slough and Bombyx batryticatus<sup>[9]</sup>, and Yang Lishan calls Bombyx batryticatus and cicada slough holy drugs for treating febrile diseases. Since then, Bombyx batryticatus and cicada slough have been used clinically as classic drug pairs.

### 2.2 Ancient and Modern Pharmacological Effects of Drugs on Bombyx Batryticatus-Cicada Slough

#### 2.2.1 Bombyx Batryticatus

Bombyx batryticatus, also known as stiff worm and natural worm, is a dry whole worm that died of Beauveria bassiana infection. It first appeared in Shennong Materia Medica Classic, which is salty, pungent and flat in nature and belongs to liver, lung and stomach meridians<sup>[10]</sup>. The 2015 edition of Chinese Pharmacopoeia<sup>[11]</sup> describes that the commonly used amount of water decoction is 10 ~ 15g. The efficacy of Bombyx batryticatus has been recorded in many medical books as early as possible. For example, "Shen Ben Cao" stated that it "eliminates black spots and makes people look good"<sup>[12]</sup>; "Materia Medica Seeking Truth" tells the story of "Bombyx batryticatus, dispelling wind and cold, eliminating dampness and eliminating phlegm, and warming blood vessels"; Compendium of Materia Medica mentions that it can "dispel wind, phlegm and tuberculosis... toothache of wind insects, skin wind sores, erysipelas itching..."<sup>[10]</sup>, which shows that this product has TCM effects such as clearing away heat and toxic materials, dispelling wind and relieving spasm, eliminating phlegm and resolving stagnation, promoting blood circulation and dredging collaterals, and beauty beauty.

According to modern pharmacological research, Bombyx batryticatus has a wide range of pharmacological effects, including anti-inflammatory, anti-oxidation, anti-virus, anti-tumor, lowering blood sugar, blood lipid and other biological activities, which is related to the fact that it contains a large number of flavonoids-quercetin and kaempferol<sup>[13]</sup>. Among them, quercetin found in the other two studies that it can play an anti-rapid allergic reaction by inhibiting the release of inflammatory mediators and reducing inflammatory reaction<sup>[14]</sup>; And cathepsin D is the key target of quercetin, which is involved in mediating apoptosis and proliferation of cells, degeneration of cell matrix, angiogenesis, etc.<sup>[15]</sup>, which can improve vascular permeability and increase plasma

albumin. In addition, many studies have shown that *Bombyx batryticatus* has strong anti-inflammatory effect. Beauverin, as one of the main pharmacological active substances of *Bombyx batryticatus*, has broad-spectrum bacteriostasis, which can enhance the phagocytosis of leukocytes and anti-inflammatory effect<sup>[16]</sup>; Huang Jumin etc.<sup>[17]</sup> found that *Bombyx batryticatus* can also reduce the content of serum IL-4, inhibit the level of helper T cells (Th)2, increase the activity of interferon (IFN)- $\gamma$ , enhance the level of Th1 and restore the balance of Th1/Th2. In addition to the above findings, *Bombyx batryticatus* can stimulate adrenal cortex because *Bombyx batryticatus* contains a large amount of protein<sup>[18]</sup>; The pharmacological action of *Bombyx batryticatus* is closely related to its active components and nutritional components. It contains 12 kinds of trace elements, which shows that *Bombyx batryticatus* also has good nourishing and disease prevention effects<sup>[19]</sup>.

### 2.2.2 Cicada Slough

Cicada slough, also known as cicada skin, cicada clothes, etc., was first published in Shennong Materia Medica Classic, while its name was first found in Medicinal Properties Theory. It is sweet, salty and cold in nature, and belongs to lung and liver meridians. It is a product for clearing away lung and liver wind and heat<sup>[16]</sup>, and the recommended dose is 3 ~ 6g<sup>[20]</sup>. In view of the efficacy of cicada slough, Compendium of Materia Medica records that it can “treat head wind vertigo, skin wind-heat, acne and itching...”, and Compendium of Materia Medica Volume 41 states: “Cicada is the result of civil residual qi... its qi is clear and deficiency, so its main treatment is all wind-heat syndrome”, that is, cicada slough is clear and uplifting, which can evacuate wind-heat, invigorate spleen and disperse lung. Professor Zhang Zongli applied this effect of cicada slough, took cicada slough as the monarch medicine, and combined with *Bombyx batryticatus* to treat intractable proteinuria, with good effect<sup>[6]</sup>. In addition, cicada slough can also relieve sore throat, improve eyesight, relieve nebula, stop wind and spasm, diuresis and relieve stranguria. In addition, Yang Lishan highly praised cicada slough, and thought that cicada slough was “light, clear and clever, and was the holy medicine for treating blood diseases”, and called it “the essential medicine for macula” and “the holy medicine for warm diseases”.

Modern pharmacological research shows that cicada slough mainly contains chitin, protein, amino acids and various trace elements needed by human body<sup>[21]</sup>. The main component of chitin is chitin, which has the functions of resisting cancer, improving human immunity, detoxifying and protecting liver; There are many amino acids, including 17 kinds of hydrolyzed amino acids, mainly aspartate, tyrosine and glutamic acid; The content of aluminum is the highest in trace elements, followed by calcium, iron, manganese, zinc and phosphorus<sup>[22]</sup>. The anticonvulsant effect of cicada slough is related to amino acids and trace elements Al, P, Ca and Mg. Yang Lu etc.<sup>[23]</sup> found that cicada slough contains three acetyldopamine dimers and four phenolic compound monomers. Acetyldopamine dimers can resist infection and oxidation, strengthen lipid metabolism, alleviate proteinuria and inhibit the proliferation of mesangial cells. Zhang Chi et al.<sup>[24]</sup> found that cicada slough has immunosuppressive and anti-allergic effects, and cicada slough extract can inhibit nonspecific immunity, and can obviously inhibit delayed allergy and cellular immune function. Wang Qinglin etc.<sup>[25]</sup> found that cicada slough not only inhibited animal skin allergic reaction and iv hypersensitivity reaction, but also reduced capillary permeability. This is corresponding to the pathogenesis of IgA N, which can reduce the deposition of IgA in mesangial area of glomerulus. Similar to *Bombyx batryticatus*, it can alleviate the inflammatory state of nephropathy and relieve proteinuria and other symptoms. Zhang Jing etc. found that the water extract of cicada slough can reduce the contents of interleukin (IL-2, IL-5) and thromboxane B2 in serum, increase the content of 6-keto-PGF1  $\alpha$ , slow down chronic inflammation and improve microscopic blood stasis<sup>[26]</sup>. In addition, the water extract of cicada slough can sedate, relieve pain, relieve fever, anticoagulate and

protect cardiovascular and cerebrovascular diseases, and the alcohol extract of cicada slough can protect erythrocyte membrane.

### 3. Results and Discussion

According to the above analysis, Bombyx Batryticatus and Cicada Slough are used to treat IgA N, and they are used as paired drugs. There are potential advantages in treating IgA N:

First, Bombyx batryticatus and cicada slough have similar functions, and they are both light and clear products, which can relieve exterior syndrome and promote qi<sup>[27]</sup>, relieve exterior syndrome, dispel wind and sweat, and announce clear qi upward, which not only means “lifting the pot and uncovering the cover”, but also has the method of “opening the ghost door”; The other two drugs can dispel wind and relieve spasm, Relieve sore throat and asthma, IgA N pathology showed that immunoglobulin A was mainly deposited in glomerular mesangial area, Traditional Chinese medicine believes that wind evil is closely related to immune diseases, and the pathogenesis of IgA N is highly consistent with the pathogenic characteristics of wind evil and good deeds<sup>[28]</sup>. Bombyx batryticatus-cicada slough are combined with each other, and their functions are similar, which can enhance the therapeutic effect. Moreover, there are many inducements such as infection in the onset of this disease, especially upper respiratory tract infection in clinic. In addition, compared with cicada slough, Bombyx batryticatus is slightly weaker in dispelling wind, and is better at resolving stagnation and eliminating phlegm turbidity in meridians. However, cicada slough is good at penetrating evil, dispersing wind and heat, eliminating phlegm and dredging collaterals, and the compatibility of the two drugs can make up for each other's shortcomings;

Second, Bombyx batryticatus is flat in nature and cicada slough is cold in nature. The two are compatible, and the efficacy of cicada slough is stronger than that of Bombyx batryticatus. However, Bombyx batryticatus, as a flat medicine, has the characteristics of “two-way applicability”<sup>[29]</sup>, which is applicable to Bombyx batryticatus regardless of cold, heat, deficiency and excess. Matching with cicada slough can not only exert the efficacy and enhance the efficacy, but also has no disadvantages of over-use of same-sex drugs;

Thirdly, Ye Tianshi called insect drugs “those who fly rise, those who walk fall, blood does not stagnate, and gas and liquid are publicized”<sup>[30]</sup>. Bombyx batryticatus and cicada slough are both insect drugs, “flesh and blood sentient things”, which can enter the collaterals to search for wind, collect and extract hidden evil<sup>[31]</sup>, enter the qi and divide the blood, and taste pungent and salty. For kidney disease, salty can enter the kidney and reach the disease position directly. In addition, the kidney collaterals are complex and tortuous, and non-ordinary vegetation products can be attacked. The two properties are good and smart, and the effect of walking and channeling is strong, which can break blood and remove blood stasis<sup>[32]</sup>. Tang Rongchuan discussed in “Questions and Answers on Materia Medica” that “animals are utilitarian, especially plants, and they are aggressive because of their animal properties”<sup>[33]</sup>. The compatibility of the two drugs may play more roles in IgA N;

Fourthly, although IgA N is located in kidney, it is related to lung and spleen. Gao Kun etc.<sup>[5]</sup> found through data research that the drugs for treating IgA N in clinic mostly belong to liver, lung, stomach, spleen and kidney meridians. The use of drugs in liver meridian seems to be inconsistent with the disease location, but most of the drugs in lung, stomach, spleen and kidney meridians belong to liver meridian at the same time. Qiu Renhong etc.<sup>[30]</sup> believe through research that liver stagnation turns fire, wood fire punishes gold, and lungs are also easily disturbed, while Bombyx batryticatus and cicada slough belong to the lung and liver meridians, which can be used as meridian-introducing drugs in the prescription, so that the drugs can reach the disease;

Fifthly, from the modern pharmacology, it can be seen that both Bombyx Batryticatus and Cicada slough can reduce capillary permeability, inhibit nonspecific immunity, and obviously inhibit

cellular immune function<sup>[28]</sup>. Studies have found that, Cicada slough and Bombyx batryticatus can down-regulate TLR4 overexpression in kidney tissue<sup>[34]</sup>, down-regulate and inhibit inducible nitric oxide synthase and endothelin-1 overexpression in kidney tissue<sup>[35]</sup>, And inhibit the overexpression of TGF- $\beta$ 1<sup>[36]</sup>, so as to reduce proteinuria, reduce the permeability of glomerular capillaries, improve renal perfusion, increase plasma albumin, improve lipid metabolism<sup>[37, 38]</sup>, inhibit the proliferation of glomerular mesangial cells, reduce the accumulation of mesangial matrix, and protect the kidney. Compared with stiff cicada, cicada slough has advantages in reducing 24-hour urine protein or increasing blood albumin<sup>[34, 36]</sup>, so the combination of the two can play a more effective role; At the same time, their anticoagulant, antithrombotic and fibrinolytic mechanisms also provide more feasibility for the treatment of chronic kidney disease.

#### 4. Conclusion

Bombyx batryticatus-cicada slough, as a classic antidote, can disperse wind-heat, clear away heat and toxic materials, relieve sore throat, relieve spasm, eliminate phlegm and dissipate stagnation. In modern pharmacology, it is considered that it can inhibit bacteria in a broad spectrum, inhibit skin allergic reaction and late and rapid hypersensitivity reaction, reduce capillary permeability, stimulate adrenal cortex, nourish and prevent diseases. Clinically, it is also proved that they have good improvement effects on proteinuria, hematuria and backache of IgA N. Therefore, it can be concluded that Bombyx Batryticatus-Cicada slough has a potential role in the clinical treatment of IgA N, no matter from the study of nature, taste, function, indications and modern pharmacology of both traditional Chinese medicines, or from the study of traditional Chinese medicine and modern etiology and pathogenesis of IgA N. The disadvantage is that, At present, most literatures discuss Bombyx batryticatus or cicada slough as a single medicine, However, there are few clinical control studies on Bombyx batryticatus-cicada slough as a pair of drugs in the treatment of IgA N, and there are few experimental studies on the two as a pair of drugs, which can not verify the mechanism of its action on nephropathy, which provides a basis for further in-depth research and application of this pair of drugs in the treatment of IgA N.

#### References

- [1] Cai Wanling, Yang Xueyuan, Yan XiaoNing, et al. Application of traditional Chinese medicine and horn medicine in skin diseases [J]. Shi Zhen Traditional Chinese Medicine and Traditional Chinese Medicine, vol.31, no.07, pp. 1682-1683, 2020.
- [2] Hu En, Chen Qing-Rong, Lin Hui-li. Clinical case analysis of Yongan "Bawei Decoction" [J]. Chinese Folk Therapy, vol.29, no. 07, pp.104-105, 2021.
- [3] Xiao Min, Zhang Li, Ai Rudi. Analysis on the treatment of Pruritus by silkworm and Cicada decidua [J]. Liaoning Journal of Traditional Chinese Medicine, no.12, pp.1621-1622, 2006.
- [4] Xu Guo-shuang, Zhou Mei-lan, Bai Ming, et al. Progress in the diagnosis and treatment of IgA nephropathy [J]. Chin J Nephropathy, vol.5, no.05, pp.203-208, 2016.
- [5] Gao Kun, Xia Ping, Yi Lan, et al. Analysis of academic characteristics and medication rules of Chinese medical master Professor Zou Yanqin in the treatment of I G A nephropathy based on data mining [J]. Clinical journal of modern Chinese medicine, vol.27, no.06, pp.27-32, 2020.
- [6] Wang Yi-yang, Han Yang, He Xue-zhi, et al. Zhang zongli's experience in the treatment of refractory proteinuria by silkworm and cicada decidus [J]. Hunan journal of traditional Chinese medicine, vol.32, no.10, pp.34-36, 2016.
- [7] Sun Xiaoguang, CAI Junbao, Sang Xiaopu, et al. Dr. Peng Jianzhong's experience in the treatment of infective fever in children with Cicada deciduous and silkworm medicine [J]. Clinical journal of modern Chinese medicine, vol.27, no.05, pp.61-63+76, 2020.
- [8] Liu Fu-gui, DING Rui-cong, PENG Chao-qun, LIU Ling, Ji Ke. [J/OL]. Journal of Basic Medicine of Traditional Chinese Medicine, pp.1-9, August 2021.
- [9] Wang Wei, Feng Qingyuan, Gao Feng, et al. Analysis of medication rule of "Cold Temperature Bar Differentiation" based on database technology [J]. Chinese journal of traditional Chinese medicine, vol.33, no.5, pp. 77-80, 265, 2015.

- [10] Qiao min, Miao deguang. Experience of insect drugs in the treatment of psoriasis [J]. *Modern distance education of Chinese medicine*, vol.17, no.06, pp.26-27+36, 2019.
- [11] Xia Qian, Shang Qiang, Zhang Runrong, et al. Determination of *Beauveria bassiana* in Silkworm and its preparations by U H P L C Q T O F M S [J]. *Proprietary Chinese medicine*, no.10, pp. 2652-2655, 2020.
- [12] Han Si-yin, LAN Tai-jin, YAN Qiang-qiang, et al. Study on the compatibility of internal and external prescription of Chinese medicine in treating melasma based on TCM inheritance auxiliary platform [J]. *Asia Pacific traditional medicine*, vol.17, no.06, pp.147-151, 2021.
- [13] Quan Hao-hao, Zhang Xiao-feng, GAO Kai, et al. Study on the main pharmacological effects of *bombyx mori* based on network pharmacology [J]. *Western China journal of traditional Chinese medicine*, vol.34, no.03, pp.92-96, 2021.
- [14] Shi L Y, DING H, LU X, et al. Quercetin antianaphylaxis in rats [J]. *Chinese patent medicine*, vol.38, no.9, pp.1906-1909, 2016.
- [15] PRUITT F L, HE Y, FRANCO O E, et al. Cathepsin D acts as an essential mediator to promote malignancy of benign prostatic epithelium [J]. *Prostate*, vol.73, no.5, pp.476-488, 2013.
- [16] Hu Ying-jie, Sun Feng-ping, Han Xue. Application of cicada deciduus and silkworm medicine in children's common diseases [J]. *Chinese pediatrics of integrated traditional and western medicine*, vol.12, no.04, pp.295-297, 2020.
- [17] Huang J m, su m s, zhang y m, et al. Study on chemical constituents of *bombyx mori* [J]. *Chinese materia medica*, vol.40, no. 1, pp. 87-89, 2017.
- [18] Huang Hai-ying, PENG Xin-jun, PENG Yan-gu. Advances in modern research of *Bombyx mori* [J]. *Journal of Hunan University of Traditional Chinese Medicine*, no.04, pp.62-64, 2003.
- [19] Zhou Xin-chen, XIE Hong-qing, LI Conghui, et al. Analysis of main nutritional constituents in *bombyx mori* [J]. *Sericulture bulletin*, Vol.51, no.04, pp.11-14, 2020.
- [20] Yang yuchen, xu li. The application of animal drugs in children with asthma [J]. *Chinese folk therapy*, Vol.29, no.04, pp.72-74, 2021.
- [21] Gao Chang-chang, ZHANG Meng-qi, Cao Jing, et al. Research progress on pharmacological action and clinical application of *cicada decidua* [J]. *Journal of traditional Chinese medicine*, Vol.43, no.02, pp.110-112, 2015.
- [22] Zhao Zijia, Zhou Guirong, Wang Yu, et al. Study on chemical constituents and pharmacological effects of *cicada decidua* [J]. *Jilin traditional Chinese medicine*, vol.37, no.05, pp.491-493, 2017.
- [23] Yang Lu, Li Guoyu, Wang Jinhui. Research status of chemical constituents and pharmacological effects of *cicada decidua* [J]. *Agricultural reclamation medicine*, vol.33, no.02, pp.184-186, 2011.
- [24] Zhang chi, Yang J. Research progress on pharmacological action and clinical application of *cicada deciduae* [J]. *Hunan journal of traditional Chinese medicine*, vol.30, no.11, pp.194-195, 2014.
- [25] Wang QING-lin. Clinical application of *Cicada Decidua* in pediatrics [J]. *Jiangsu Traditional Chinese Medicine*, No.12, pp.53-54, 2003.
- [26] Zhang Yao, Yang Ji, Wang Qiang. Study on the application of *cicada decidua*, *digulosaurus* and silkworm in chronic airway diseases [J]. *Hunan journal of traditional Chinese medicine*, vol. 35, no.08, pp.155-157, 2019.
- [27] Li Peihan, Zhang Yongzhong, Xu Yipeng, et al. Research on Yang lishan's thought of treating epidemic disease based on the prescription of shengliang SAN [J]. *Chinese journal of traditional Chinese medicine*, vol.34, no.06, pp.2547-2550, 2019.
- [28] Yang Ke, Li Jing, He Junbo, et al. Effect of wind pathogenic factors on IgA nephropathy [J]. *Chinese journal of integrated traditional and western medicine nephropathy*, vol.22, no.01, pp.77-79, 2021.
- [29] Zhang Jing, Hu Hao, Zheng Xiao. Pharmacological effects of *bombyx mori* and its compatibility in respiratory diseases [J]. *Shanxi journal of traditional Chinese medicine*, vol.37, no.03, pp.53-54+60, 2021.
- [30] Qiu Renhong, Ying Yanhua. [J]. *Journal of traditional Chinese medicine*. vol.36, no.07, pp.1426-1429, 2021.
- [31] Xiao Min, Zhang Li, AI Rudi. Treatment of pruritus by silkworm and *Cicada decidua* [J]. *Liaoning Journal of Traditional Chinese Medicine*, no.12, pp.1621-1622, 2006.
- [32] Zhan Jing, Yu Qun, Yang Bo. Yang hongtao's experience in the treatment of renal proteinuria [J]. *Chinese journal of integrated traditional and western medicine nephropathy*, vol.22, no.01, pp.4-6, 2021.
- [33] Jing Yue-lan, WU Da-hua, Yao Ting. Wu dahua's experience in the treatment of brain diseases with insect drugs [J]. *Clinical journal of traditional Chinese medicine*, vol.32, no.11, pp.2058-2062, 2020.
- [34] Yu Junsheng, Du Yajing, Wang Huihui. Effects of *Cicada decidus* and silkworm on expression of Toll-like receptor 4 in renal tissue of mesangial proliferative glomerulonephritis model rats [J]. *Chinese journal of traditional Chinese medicine*, Vol.33, no.01, pp.7-9+1, 2015.
- [35] Du Ya-Ching, WANG Hui-hui, YU Ying-lan, and et al. Effects of *Cicada decidus* and silkworm on expression of iNOS and ET in mesangial proliferative nephritis model rats [J]. *Chinese journal of integrated traditional and western medicine nephropathy*, vol.15, no.05, pp.429-431, 2014.
- [36] Wang Hui-Hui, Bao Hong, YU Jun-sheng, et al. Effects of *cicada deciduous* silkworm on mesangial proliferative

*nephritis in rats [J]. Sichuan journal of traditional Chinese medicine, vol.32, no.02, pp.69-71, 2014.*

[37] Shi F, MA X Y. *Analysis on the application of insect drugs in the treatment of proteinuria in glomerulonephritis based on the “virus-collaterals” theory [J]. Asia-pacific traditional medicine, vol.16, no.09, pp.121-123, 2020.*

[38] Ren Yuhong. *Literature study on the application of four kinds of drugs for dispelling wind and dredging collaterals in chronic kidney disease [D]. Shandong University of Traditional Chinese Medicine, 2011.*