



A.E.M

VOLUME 9 ISSUE 1

ISSN: 2315-456X

Advanced Emergency Medicine



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Volume 9 Issue 1 • 2020

ISSN: 2315-456X

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Advanced Emergency Medicine

<http://aem.usp-pl.com/index.php/aem>

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Clinical Observation on the Treatment of Jellyfish Stinging Dermatitis with Qibai Collapse Stains

Huaian Li*, Jin Zhou

Qinhuangdao Hospital of Traditional Chinese Medicine, Qinhuangdao 66000, Hebei, China. E-mail: yyx1202yeah.net

Abstract: Objective: To observe the clinical effect on the treatment of jellyfish stinging dermatitis with Qibai collapse stains, and analyze the application value of Qibai collapse stains. Methods: From January 2018 to December 2019, 180 patients with jellyfish stinging dermatitis admitted to our hospital were selected as the research objects. They were randomly divided into experimental group and control group, and the patients in the control group were given routine treatment. Based on the routine treatment, the experimental group was treated combined with external application of Qibai collapse stains ointment. Compared with the therapeutic effect of the two groups, the clinical value in the treatment of jellyfish stinging dermatitis with Qibai collapse stains ointment was analyzed. Results: The total effective rate was 97.8% in the experimental group and 83.3% in the control group. The difference between the two groups was statistically significant ($P < 0.05$). The effect time, swelling time, pain relief time and treatment course in the experimental group were significantly less than those in the control group, with statistically significant differences ($P < 0.05$). Conclusion: The clinical effect on the treatment of jellyfish stinging dermatitis with Qibai collapse stains is remarkable, which can accelerate the recovery of patients, and is worthy of clinical application.

Keywords: Qibai Collapse Stains; Jellyfish Stinging Dermatitis; Clinical Effect

1. Introduction

Jellyfish dermatitis is a kind of cnidaria dermatitis. Cnidaria is a unique organelle of cnidaria. When these animals with cnidaria contact the human body, they can prick the cnidaria into the skin and inject the poison into the human body, causing skin damage and inflammation^[1]. Western medicine treatment of jellyfish stinging dermatitis is mainly anti-allergic, but the effect is not quite ideal. There are studies show that the external effect of traditional Chinese medicine is remarkable^[2-3]. This work aimed to verify the clinical value on the treatment of jellyfish stinging dermatitis with Qibai collapse stains. Some patients were selected as subjects for a randomized group controlled study. The specific

study report is as follows.

2. Information and methods

2.1 General information

From January 2018 to December 2019, 180 patients with jellyfish stinging dermatitis admitted to our hospital were selected as the research objects. All participants voluntarily participated in the research and signed the informed consent, and the research was approved by the ethics society. The patients were randomly divided into experimental group and control group with 90 patients in each group. In the experimental group, there were 48 males and 42 females, with an average age of (39.6 ± 4.5)

years between 24~56 years. In the control group, there were 46 males and 44 females, with an average age of (39.6 ± 4.5) years between 24~56 years. Patients with severe cardiovascular disease, hepatorenal insufficiency and mental disorders were excluded to ensure that the results of the research would not be affected.

2.2 Methods

All patients with jellyfish stinging were examined by routine physical examination. Vital signs were measured. Both lungs were normal without dry and wet rales. The patients in the control group were given routine treatment, including thorough removal of residual cnidaria from the skin, and 5%~10% sodium bicarbonate solution to wash damaged skin and wet application for 30min. Also, it includes intramuscular injection of diphenhydramine, promethazine injection, dexamethasone 5-10mg into the pot for once, and vitamin C calcium gluconate injection for antiallergic treatment. Based on the routine treatment, the patients in the observation group were applied with Qibai collapse stains ointment. The collapse stains ointment was made of Borneol 100g, Borax 100g, raw Phellodendron 100g and raw Astragalus 100g. The ointment was made by mixing powder and vinegar. The ointment was evenly spread on the cotton paper and the thickness was moderate. The spread cotton paper was applied on the affected skin of the patients, and the scope was larger than the damaged skin. It is fixed with breathable adhesive tape once a day for 4-6 hours each time for a course of 5 days.

2.3 Observation indicators

The clinical value of Qibai collapse stains ointment was analyzed by comparing the treatment effect, onset time, swelling time, course of treatment and pain relief time between the two groups. Curative effect standard: Cure: the skin swelling pain symptom disappears, and the erythema, blister, papule or itching sensation disappears. Effective: the skin swelling pain symptom alleviates, and the erythema, blister, papule or itching sensation alleviates. Ineffective: the patient's various symptoms slightly or not significantly improved.

2.4 Observation indicators

SPSS19.0 software was used for statistical analysis, and t test was used for comparison of measurement data. χ^2 test was used for counting data, and $P < 0.05$ was considered as statistically significant.

3. Results and discussion

3.1 Therapeutic effect of two groups

The total effective rate was 97.8% in the experimental group and 83.3% in the control group. The difference between the two groups was statistically significant ($P < 0.05$) (See **Table 1**).

3.2 Comparison of indicators between the two groups

The effect time, swelling time, pain relief time and treatment course in the experimental group were significantly less than those in the control group, with statistically significant differences ($P < 0.05$). (See **Table 2**)

Group	Cure	Effective	Invalid	Total effectiveness
Experimental group	80(88.9)	8(8.9)	2(2.2)	88(97.8)
Control group	65(72.2)	10(11.1)	15(16.7)	75(83.3)

Table 1. Therapeutic effect of two groups [n (%)] (n=90)

Group	Effective time (min)	Swelling time (d)	Course of treatment (d)	Duration of pain relief (d)
Experimental group	5.6 ± 0.7	3.1 ± 0.4	5.3 ± 0.6	2.2 ± 0.3
Control group	20.5 ± 3.2	6.4 ± 0.9	8.9 ± 1.2	4.8 ± 0.5

Table 2. Comparative results between the two groups of patients (n=90)

4. Discussion

The skin of jellyfish after stung has electric shock like tingling, numbness, itching and burning sensation. After 4-6 hours, there were linear erythema, papule, wheal, ecchymosis and other dermatitis symptoms. The body has muscle pain, fatigue, chest short, palpitations, shortness of breath, low fever, thirst, cold sweat, etc. A few people are sick and vomiting, abdominal pain, diarrhea, dyspnea, restlessness, blood pressure drop, hemoptysis and phlegm, and they can die of pulmonary edema and allergic rest if rescue is not timely^[4-5]. Toxic mechanism of jellyfish stinging. There are many tentacles around the mouth and on the shoulder plate of jellyfish, which contain many cnidaria bursa, and the bursa contains the cnidaria toxin. Its main components are protein-like toxin, elastase, carboxypeptidase, strong anesthetics, kinin, vasoactive amines and other vasoactive substances. Once the human skin contacts the tentacles of jellyfish, the cnidaria bursa in it will release the cnidaria toxin, kallikrein and vasoactive amine rapidly. This can make the venules and capillaries expand, the permeability increase, the exudation increase, and the skin hyperemia and edema. Kallikrein and other substances can also produce strong pain, and vasoactive amines can produce itching. Protein-like toxins can cause tissue necrosis, and a large number of cnidaria toxin into the body can cause systemic capillary expansion, sharp increase in permeability, decrease in effective circulation blood volume, and cause hooker.

Due to jellyfish toxin can be neutralized by alkaline solution, traditional western medicine can wash the damaged skin with alkaline solution such as 5%~10% sodium bicarbonate solution or alum water, 1% ammonia water, and thoroughly remove the prickles in the skin. According to traditional Chinese medicine, jellyfish sting belongs to the acute disease of insect and animal injury poisoning. The poison enters through the skin, restrain pathogenesis, enters the air from the pathogenesis, spreads in the wind and fire, and the heat is full of wind. At present, there is little mention on traditional Chinese medicine in the domestic reports on the treatment of jellyfish sting. Based on the characteristics and pathological basis of jellyfish stinging dermatitis, this hospital made its own Qibai collapse

stains ointment. The specific prescription of the drug is Astragalus, Phellodendron, Borneol, Angelica, etc. It is developed into a fine powder. After 120 mesh screening, it is made into an ointment with vinegar or honey, which is ready for use after high-temperature sterilization. According to the theory of internal disease and external treatment in traditional Chinese medicine, the treatment of collapse stains is based on the external treatment method of "bathing by rubbing" proposed in *Yellow Emperor's Inner Canon*. The traditional Chinese medicine, which can clear away heat, dry dampness, relieve fire, detoxify, diminish inflammation and relieve pain, can be directly absorbed into the skin through the dam stain. This can make the surrounding skin and subcutaneous tissue edema disappear, and relieve pain from the local effect. *The Compendium of Materia Medica* said that "the main hot wound... insect sores". Modern pharmacological research shows that Phellodendron has antifungal and bacteriostatic effects, and the different berberine contained in the leaves of Phellodendron has anti herpesvirus activity. Astragalus has sweet taste, small temperature, lung and spleen channels, and it has the functions of invigorating Qi and Yang, invigorating Qi and strengthening surface, promoting toxin and muscle, and promoting water and swelling. *The Sutra* said that "main carbuncle gangrene... discharge pus and relieve pain". *The Pearl Sac* said that Astragalus have five functions: "... Leaving muscle heat, the fourth, discharge pus and relieve pain, promote blood circulation and generate blood... It is the holy medicine of the sore family ". The modern pharmacological action of Astragalus is antibacterial, antiviral, analgesic and anti-inflammatory, which can increase the collagen synthesis of tissue^[6]. Borneol has local analgesic and antiseptic inhibitory bacteria effects, and borax has anti-corrosion and protection of skin and mucous membrane effects. Angelica can nourish and activate blood. All drugs are used together to clear away heat and detoxify, promote blood circulation and eliminate swelling, and promote the growth of muscles and relieve pain. In order to verify the effect on the treatment of jellyfish stinging dermatitis with Qibai collapse stains, some patients in the hospital were selected as the image segmentation group contrast study. The data showed that the total effective rate was 97.8%

in the experimental group and 83.3% in the control group. The difference between the two groups was statistically significant ($P < 0.05$). The effect time, swelling time, pain relief time and treatment course in the experimental group were significantly less than those in the control group, with statistically significant differences ($P < 0.05$). This indicated that external application of Chinese herbal medicine Qibai collapse stains can significantly improve the treatment effect of jellyfish stinging dermatitis.

In conclusion, Qibai collapse stains ointment has a remarkable effect on the treatment of jellyfish stinging dermatitis, which can obviously shorten the course of treatment and promote the patients to recover more quickly. At the same time, it can alleviate the pain and skin swelling of the patients, which has certain clinical value and is worth popularizing and applying vigorously.

References

1. Tian C, Zheng X, Wang W. Clinical observation on external application of Qibai collapse stains on pediatric phlebitis (in Chinese). *Guangdong Medical Journal* 2018; 39(7): 1103-1105. doi: 10.13820/j.cnki.gdyx.2018.07.020.
2. Shang G, Li H, Xiao J. Clinical observation of Qibai collapse stains on treating traumatic dermatitis (in Chinese). *Guangdong Medical Journal* 2016; 37(15): 2245.
3. Liu W, Su W, Jiang G, *et al.* Chinese and western medicine treatment of jellyfish dermatitis (in Chinese). *Journal of Navy Medicine* 2018; 39(6): 584-586. doi: 10.3969/j.issn.1009-0754.2018.06.035.
4. Liu X. Therapeutic effect of cold and wet compress on traditional Chinese medicine for the treatment of jellyfish dermatitis (in Chinese). *Guangming Journal of Chinese Medicine* 2009; 24(1): 82-83. doi: 10.3969/j.issn.1003-8914.2009.01.058.
5. Hong Y, Zhao L, Wang Y, *et al.* Analysis on the effect of external application in traditional Chinese medicine Qibai on jellyfish dermatitis stellata (in Chinese). *Journal of Hebei TCM and Pharmacology* 2018; 33(6): 22- 23 + 58.
6. Yang W, Sun Z. Progress in clinical application of traditional Chinese medicine external application (in Chinese). *World Medical Information Abstracts* 2019; 19(28): 80-81.

Application of Artificial Intelligence in Medical Imaging Diagnosis

Linyi Zhang*

China Jiliang University, Hangzhou 310000, Zhejiang, China. E-mail: 1062303712@qq.com

Abstract: Both the treatment of cancer and other serious diseases often depends on the diagnosis of artificial complexity and heavy experience. The introduction of artificial intelligence in medical imaging has injected vitality into the diagnosis of images. Artificial intelligence uses deep learning, image segmentation, neural networks and other algorithms flexibly in image recognition through learning data sets to extract features for accurate diagnosis of clinical diseases. At the same time, it also plays a special role in controlling the spread of infectious diseases such as new coronary pneumonia.

Keywords: Artificial Intelligence; Cancer Diagnosis and Treatment; Medical Imaging; Image Processing

In recent years, big data and artificial intelligence have made breakthroughs in key technologies. Artificial intelligence is increasingly closely related to medical imaging diagnosis, and combining the main algorithms of artificial intelligence with medical imaging can efficiently promote the accuracy of medical imaging instruments and provide favorable material guarantee for doctors to make diagnosis. Artificial intelligence helps screen for diseases and diagnose patients, and needs to be judged from imaging, biochemistry, etc. Routine testing relies on CT and X-rays. It can be seen that images play an extremely important role in the doctor's judgment. Making full use of artificial intelligence to help doctors judge diseases and predict diseases is the future direction.

1. Big data in medical imaging

Artificial intelligence contains data, algorithms, computing power three elements. Big data as the cornerstone of artificial intelligence, for the subsequent algorithm, computing power provides a material basis. The operation mechanism of artificial intelligence

is based on a large number of effective and reliable training samples, which is constantly updated and accumulated by specific algorithms and then applied to production and life. It can be seen that the stability of the training sample acquisition channel, the feasibility of the sample itself both the advantages and disadvantages of the algorithm will determine the application effect of artificial intelligence.^[1]

Medical imaging big data used to be collected in their respective health care facilities, resulting in poor mobility. At present, the rapid development of cloud computing, crossed the space limitations, can easily access the resources uploaded by the cloud, and promote the development of medical imaging. Common medical imaging techniques include nuclear magnetic resonance, ultrasound imaging, diffuse optometry, computed tomography (CT) and so on, so artificial intelligence needs to set different algorithms with characteristics to be applied to different fields of medical imaging diagnosis.^[2] The constant "intelligence" of medical imaging has brought the gospel to the first-line medical diagnosis.

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doi: 10.18686/aem.v9i1.155

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2. The principle of medical imaging diagnosis

The algorithm for medical imaging diagnosis comes from the neural networks of artificial intelligence and deep learning. At the same time, based on the particularity of medical imaging, image processing technology has been widely used.

Deep learning algorithm has the advantage of being able to handle the variable and unstable signal data because of its unique flexibility, and has been effectively applied in the field of medical image diagnosis, and the special application of convolutional neural network in image recognition and processing also plays an important role in image technology and robot vision. Weijia Li *et al.* on the lung imaging detection of the article on the initial confirmation of convolutional neural network in the lung imaging detection reliability.^[3] Image recognition algorithms commonly used in medical imaging include Alex Net, Mobile Nets, VGG16 neural network model. Jinfan Zhou^[4] studies and analyzes the lung X-ray image based on big data, and finally selects the VGG16 model with good resolution effect to improve the algorithm to get the optimal model.

The application of artificial intelligence in medical imaging diagnosis can improve the quality of pictures through technical means, break through the limitation of the human eye's own resolution, make medical instruments better serve the daily diagnosis and treatment process, greatly facilitate doctors to make accurate diagnosis of the patient's status quo, and also make the patient get the first time effective treatment.

3. Examples of the application of artificial intelligence in medical imaging diagnosis

3.1 Cancer of the liver

Image processing plays a vital role in image diagnosis and treatment. With the development of science and technology, people pay more attention to the extraction of features in images. The extraction of high characteristics has undoubtedly become the direction of people's pursuit. This algorithm can directly extract the key information in the image and weaken other irrelevant information, providing a solid guarantee for the doctor's

initial diagnosis of the disease. CT images are used in the diagnosis of liver cancer due to high signal-to-noise ratio and high resolution. The current image feature extraction is mainly texture and shape, lack of image advanced semantic expression and so on, by improving the multi-scale local two-value mode algorithm^[5] can fill this defect.

3.2 Female cancer

With the increasing incidence of cancer year by year, it has aroused the concern of the society to prevent cancer. Breast cancer and cervical cancer, as two types of cancer with higher incidence in women, can be effectively controlled by early detection and treatment. In the past, artificial diagnostic treatment was characterized by low accuracy and complexity. At this point, artificial intelligence is introduced into the cancer system, through image classification learning algorithm, can be divided into normal and disease two categories. The length of initial diagnosis is greatly shortened, and the continuous development of instrument accuracy has greatly reduced the misdiagnosis rate. The effects of the introduction of migration learning^[6] in pre-trained convolution neural networks to classify the effects of migration learning on the detectors. Using the characteristics of the data set itself to combine, abstract, migrate into the new data set features, classify again, make accurate judgment stoic medical images.

3.3 Cerebral hemorrhage

Cerebral hemorrhage is a clinically common severe brain disease. As an acute disease, it has the characteristics of high disability rate and fast onset. At present, the diagnosis of such diseases is mostly expert diagnosis, relying on clinical experience to make a judgment on the patient's illness. Diagnosis in this area lacks reliable data support.^[7] By establishing the model and the method of image segmentation, the preliminary artificial intelligence scheme of cerebral hemorrhage CT diagnosis and treatment can be formed. Collect a large number of clinical patients in different periods of brain images edit to establish the first training set, through the robot vision extraction features, output test results, for the future brain hemorrhage patients to provide a method.

3.4 The outbreak of new coronary

pneumonia

The outbreak of new coronary pneumonia is severe, and it is urgent to diagnose pneumonia patients quickly. Professor Xu's team worked with other medical institutions to build the "New Coronary Pneumonia CT Imaging Integrated Analysis AI Auxiliary System"^[9]. The system is based on CT images and includes AI analysis system and imaging analysis system. Imaging system analyzes typical imaging features of pneumonia, such as lung real change, wool glass and other analysis results. AI analysis adds a new assessment of different types of pneumonia, which has higher requirements for the accuracy of the analytical system, to distinguish the nuances of pneumonia types requires a large number of real and reliable clinical patient imaging samples. The accuracy of the diagnosis of the system was 83%, and the first-level screening of the new coronary pneumonia was realized to help the outbreak judgment. This system will subsequently expand the data set to improve judgment accuracy.

3.5 Acute intestinal blood vessel ischemia

Critical abdominal emergency, with high mortality rate, poor prognosis characteristics.^[10] The fatality rate is more than 60%, and the early symptoms are not serious, which makes it difficult for the initial diagnosis and treatment. In order to treat patients at the best time, medical imaging has intelligently developed the relevant technology of acute intestinal membrane vascular ischemia. New technologies such as digital-reducing angiography technology, non-invasive imaging examination technology, and near-infrared fluorescence imaging technology based on molecular imagery have been developed. Through the optimization of intelligent algorithm, improve the computing performance of the instrument, establish the data computing system, and promote the rapid development of medical imaging.

4. The intelligent prospect of medical imaging diagnostics

At present, cancer and clinical critical care have a greater demand for medical imaging intelligence. In the past, the complex expert experience diagnosis not only requires doctors year-round clinical experience but also

strong dependence on human. Now artificial intelligence in the medical image recognition processing technology continues to develop, can accurately and efficiently judge the patient's situation, to the doctor quickly provide first-hand effective information, easy to follow-up diagnosis. However, due to the large demand for data, narrow media scope, less contact with medical information and other factors, artificial intelligence in medical imaging diagnosis there are obstacles, the future development of big data to build a national medical information network, as well as the continuous improvement of data collection technology can effectively solve such problems.

In addition, regulators say the medical imaging diagnosis of artificial intelligence needs to be able to replace the imaging doctor.^[1] This idea plays a guiding role in the diagnosis of clinical critical disease, and combining artificial intelligence with human experience is the direction of the future development of artificial intelligence.

References

1. Zhou Q, Qi S, Xiao B, *et al.* Artificial intelligence empowers laboratory medicine in industry. *Journal of Southern Medical University* 2020; (2): 287-296. doi: 10.12122/j.issn.1673-4254.2020.02.22.
2. Li D, Wang Y, Li Y, *et al.* Artificial intelligence in medical imaging diagnosis application research (in Chinese). *Chinese Journal of Clinical Anatomy* 2020; 38(1): 110-113.
3. Li W, Chen S, Zhang L, *et al.* Pulmonary angiography detection based on deep learning image processing study (in Chinese). *Automation and Instrumentation* 2019; (12): 102-104+109.
4. Zhou J. Lung X-ray image based on big data analysis and research method (in Chinese). Guizhou University 2019.
5. Liu X. Liver CT image feature extraction and recognition study and systematic realization (in Chinese). Jiangsu University 2019.
6. Hu H. Female cancer medical image recognition applied research based on transfer learning (in Chinese). Tianjin Polytechnic University 2019.
7. Yu J. Artificial intelligence identification CT intracranial hematoma image cerebral hemorrhage blend sign correlation algorithm study (in Chinese). China Medical University 2018.
8. Wu H, Weng X, Wang L, *et al.* Medical image big data storage and mining technology research (in Chinese). *China Digital Medicine* 2016; 11(2): 2-6.
9. Zhu Y. Novel coronavirus pneumonia CT image AI system "read" in 10 seconds (in Chinese). *Health*

- News 2020; (8).
10. Zhang H. The role of medical imaging technique in acute mesenteric vascular ischemic disease diagnosis and treatment (in Chinese). *Medical Theory and Practice* 2020; 33(4): 550-552.

Detection and Optimization of Cardiac Markers Based on High Sensitivity C-Reactive Protein

Chen Dai*

Hubei 672 Orthopaedics Hospital of Integrated Chinese & Western Medicine, Wuhan 430079, China. E-mail: 1988@163.com

Abstract: Cardiac markers play an important role in prognosis and follow-up treatment. Therefore, it is of great practical significance to study the detection methods of high-sensitivity C-reactive protein cardiac markers. The purpose of this paper is to study the optimal method for the detection of cardiac markers of high-sensitivity C-reactive protein. In this paper, the significance of cardiac markers and high-sensitivity C-reactive protein and the relationship between them and myocardial infarction were first described. The BCA method for the purification and identification of C-reactive protein was studied, and then the determination and optimization of high-sensitivity C-reactive protein and high-sensitivity C-reactive protein in healthy people were further understood. To explore the application of serum high sensitive C-reactive protein in the detection of cardiac markers in 50 patients with acute myocardial infarction and 50 healthy people. The results showed that the experimental group was (21.57 ± 1.50) , (37.62 ± 1.66) , (529.20 ± 5.72) , (95.79 ± 6.24) ng / ml, the control group was (0.90 ± 1.10) , (1.71 ± 0.14) , (35.25 ± 4.21) , (0.99 ± 0.71) ng / ml, and the difference between the two groups was statistically significant ($P < 0.05$).

Keywords: Heart Marker; High Sensitivity C-reactive Protein; Detection Method; Myocardial Infarction

1. Introduction

CRP production is related to the stimulation of other inflammatory factors^[1-3]. When the structure damage, microorganism entry, antibody reaction, stress reaction and malignant tumor can stimulate the rapid increase of C-reactive protein synthesis, so that the concentration of C-reactive protein increases thousands of times. It is a globulin with molecular weight of 1-140 KD^[4-5]. If CRP continues to rise, it indicates chronic inflammation, which may also be caused by autoimmune diseases^[6]. The increase of hs CRP in blood is a useful predictor of near and peripheral vascular diseases. Although there is a close relationship between blood lipid and coronary heart disease, nearly 50% of patients with myocardial

infarction have no hyperlipidemia, which is a common mechanism difficult to explain^[7-9]. Cardiac markers are also significant in evaluating prognosis and follow-up treatment. Therefore, it is of great practical significance to study the detection methods of high-sensitivity C-reactive protein cardiac markers.

Sujaya Gupta study assessed CRP levels in patients with and without periodontitis and their relationship to BMI and smoking behavior. Serum CRP was taken before periodontal treatment, and SPSS 17 software was used for data analysis. Results: the mean level of CRP (5.8595mg / L) in periodontitis group was significantly higher than that in non periodontitis group (1.1214mg / L)

($P = 0.000$). BMI and CRP had no correlation, but they were related to periodontitis. There was no significant relationship between smoking behavior and CRP ($P = 0.344$) and periodontitis ($P = 0.541$). They found a highly significant correlation between periodontitis and CRP levels, but not always with BMI and smoking. CRP was significantly increased in periodontal infection and was a marker of CVD. Therefore, it is recommended that doctors, periodontists and patients interact closely to prevent adverse health conditions^[10]. Jonathan Buggey found that higher epicardial fat levels may be related to the duration of antiretroviral therapy and chronic inflammation, but not to other indicators of obesity, such as body mass index. They are associated with increased coronary calcium, myocardial perfusion defects, death, and myocardial infarction. The association with risk may be partly mediated by the direct action of cytokines and adipokines produced by adipose tissue. In addition, the increase of myocardial fat deposition in HIV infected patients is also related to the time of antiretroviral therapy^[11]. Beata Moczulska studied pulse wave velocity (PWV) in patients with congestive heart failure and hypertension. The arterial hardness was measured by Mobil-O-Graph NG-PWA, and the pulse velocity (PWV) was estimated. Results: PWV in DHF group was significantly higher than that in control group. The average E / a value of heart failure group was significantly lower than that of non heart failure group. Conclusion: the oscillographic measurement of pulse wave velocity is noninvasive and lasts for several minutes without the presence of experts. Even in primary health care, patients at risk of diastolic heart failure can be identified early^[12].

In this paper, the significance of cardiac markers and high-sensitivity C-reactive protein and the relationship between them and myocardial infarction were first described. The BCA method for the purification and identification of C-reactive protein was studied, and then the determination and optimization of high-sensitivity C-reactive protein and high-sensitivity C-reactive protein in healthy people were further understood. In this paper, 50 patients with acute myocardial infarction and 50 healthy people were selected to study the application of serum high-sensitivity C-reactive protein in the detection of

cardiac markers. The experimental results showed that troponin was a marker of myocardial infarction. Troponin increased in 3-5 hours, peaked in 13-37 hours and lasted for 9 days. Its sensitivity is as high as 96%.

2. Proposed method

2.1 Heart markers

Seven million people die of cardiovascular disease every year. Cardiac markers have a good diagnostic effect on cardiovascular diseases. Because some cardiac markers are not widely used, it is urgent to strengthen the promotion of diagnostic methods of cardiac markers.

Cardiac markers, such as troponin, fatty acid binding protein and ischemia modified albumin (IMA), are also significant in evaluating prognosis and follow-up treatment.

2.2 Purification and identification of C-reactive protein

- 1) Determination of protein concentration by BCA
- 2) Preparation of standard curve sample: BSA 2.0mg/ml was diluted with PBS.
- 3) Add the sample collection solution into the enzyme plate and the working solution respectively, shake and mix well, then read the od595nm data through the enzyme reader, and calculate the concentration of each tubulin through the standard curve.

2.3 Hypersensitive C-reactive protein

Hypersensitive C-reactive protein and C-reactive protein belong to the same kind of protein. The difference between them is that the measured data of hypersensitive C-reactive protein is much higher than that of C-reactive protein. The principle of immunoenhancement turbidimetry was used for the detection of hypersensitive C-reactive protein, and the detection limit of CRP was more than $3\text{-}5\text{mg} \cdot \text{L}^{-1}$ by immunotransmission turbidimetry or immunoscattering turbidimetry. In the presence of inflammation, the serum CRP level peaked 24-48 hours later, and the serum CRP level recovered to normal soon after inflammation elimination, with a half-life of 4-7 hours. The use of CRP in acute myocardial infarction and trauma and infection, and in surgery and cancer can significantly increase infiltration. Because CRP is not a stable characteristic, it

has high value in infectious diseases and connective tissue diseases. Through the discovery of cardiovascular events, it is necessary to exclude the injury of tissues, inflammation, tumor and infection in human body, and then measure the level of hs CRP. Hs CRP, as an acute reactive protein of IL-6, TNF and other cytokines, is an independent risk factor of coronary heart disease. It is generally considered that $hs\ CRP < 1.0\text{mg} \cdot L^{-1}$ is of low risk, $1.0\text{-}3.0\text{mg} \cdot L^{-1}$ is of moderate risk and $> 3.0\text{mg} \cdot L^{-1}$ is of moderate risk. It is highly dangerous. Serum $40\text{-}160\text{mg} \cdot L^{-1}$ in patients with myocardial infarction, the phenomenon of unstable angina will be higher gradually, and stable angina is also normal. Although CRP as a precursory target of coronary heart disease is supported, the increasing CRP data will be involved in the formation of atherosclerotic plaque, which will cause the phenomenon of unstable plaque rupture, which may be the sensitive index of inflammation.

(1) Hypersensitive C-reactive protein in healthy people

In general, hs CRP can detect the level of inflammation less than 0.20mg/l . The low level of inflammation detection has an important value in judging coronary heart disease, cerebrovascular disease and its risk.

(2) Determination and optimization of high sensitive C-reactive protein

Latex enhanced immunoturbidimetric method was used to improve the sensitivity and the accuracy in the low concentration range. High precision and reliability are required. Early agglutination is no longer used in most hospitals because of its poor accuracy. Immunoturbidimetry (including scattering method and transmission method) is also difficult to meet the requirements of hypersensitivity.

3. Experiments

3.1 Experimental data set

From September 2018 to March 2019, 501 patients were admitted to the Department of Cardiology. According to the inclusion criteria and exclusion criteria, 306 patients were selected. All patients passed the examination. There were 206 patients in the myocardial infarction group, including 100 males and 109 females,

all of whom were 50.47 ± 8.32 years old. 206 patients in the control group, including 105 males and 104 females, had the same average age at 47.21 ± 9.97 years old, all patients had no other serious diseases. At the time of admission, each patient was inquired about the detailed medical history by the cardiologist and recorded the information including the age, gender, smoking, drinking, history of hypertension and diabetes to be investigated; each patient was examined carefully by the cardiologist, including: blood pressure level, weight, etc. Each patient underwent ECG and venous blood sampling 24 hours after hospitalization. The contents of blood examination include: blood routine, aging of liver and kidney, changes of blood glucose, blood lipid, hs CRP, C1q and uric acid.

3.2 Detection of serum hs CRP

In this study, the value of hs CRP in the two groups of patients was detected by immunoturbidimetry, and the 7600 automatic biochemical analyzer, which was mainly equipped in the laboratory of hospital, was used as the measuring instrument for the micro quantitative detection of hs CRP. The high sensitive C-reactive protein reagent produced by Dade Behring Marburg GmbH was used for determination. The normal reference value range provided by the laboratory of the people's hospital was $0\text{-}2.1\text{mg/l}$. According to the manual and the quality control system, double standard and double tube measurement methods were used. Finally, the hs CRP values of three groups of patients were statistically analyzed.

3.3 Instruments and equipment

Rt-2100c;
Constant temperature water bath box;
Hitachi 7170A automatic biochemical analyzer;
Kdc-40 medium and low speed centrifuges from Zhongjia, HKUST;
Medical dw-86w420 low temperature refrigerator;
Siemens axidm artis DFA X-ray angiography system;
Lead-7000 multichannel physiological recorder.

3.4 Statistical methods

All data are processed and analyzed by scientific statistical software. In this study, spss19.0 software and X2 test method are used to calculate all counting data. If

the results are statistically significant, the difference will be more obvious.

4. Discussion

4.1 Comparison of isoenzyme concentration of cardiac markers between the two groups

The concentrations of high-sensitivity C-reactive protein, troponin I, myoglobin and creatine kinase isoenzyme in the experimental group were (529.20 ± 5.72), (95.79 ± 6.24) ng / ml, respectively, and those in the control group were (0.90 ± 1.10), (1.71 ± 0.14), (35.25 ± 4.21), (0.99 ± 0.71) ng / ml. the differences between the two groups were not significant but significant ($P < 0.05$), as shown in **Table 1**.

The results showed that the concentration of cardiac marker isoenzyme in the experimental group was significantly higher than that in the control group ($P < 0.05$), suggesting that there was a positive

	Hypersensitive C-reactive protein	Troponin I	Myoglobin	Creatine kinase
Test group	21.57 ± 1.50 ng/ml	37.62 ± 1.66 ng/ml	529.20 ± 5.72 ng/ml	95.79 ± 6.24 ng/ml
Control group	0.90 ± 1.10 ng/ml	1.71 ± 0.14 ng/ml	35.25 ± 4.21 ng/ml	0.99 ± 0.71 ng/ml

Table 1. Comparison of isoenzyme concentrations between the two groups

4.2 Comparison of the positive rate of cardiac marker isoenzyme between the two groups

The positive rates of high-sensitivity C-reactive protein, troponin I, myoglobin and creatine kinase

correlation between myocardial infarction and cardiac marker isoenzyme. Through the simultaneous detection of the four, we can find the early symptoms of myocardial infarction, which is very important for early diagnosis. However, the level of myoglobin in human body will gradually increase 3 hours after the onset of the disease, but the rejection to the heart is not high, and it is a marker of myocardial injury (generally speaking, the symptoms occur within 7 hours, and the level of myoglobin in the blood will gradually increase). However, we can find that another damage will be creatine kinase isoenzyme. The activity of this enzyme is related to the location, area and prognosis of myocardial infarction. This enzyme has been used as a marker of myocardial injury, but its flexibility is not high, its discrimination is poor, it is difficult to distinguish from skeletal muscle disease and injury, it is difficult to diagnose small myocardial infarction, often false-positive and false negative, it can not be used alone in clinical.

isoenzyme in the experimental group were 83%, 78%, and 49%, respectively, while those in the control group were 5%, 0%, 0%, 0% and 0%, respectively. The positive rates of cardiac marker isoenzyme were statistically significant ($P < 0.05$), as shown in **Figure 1**.

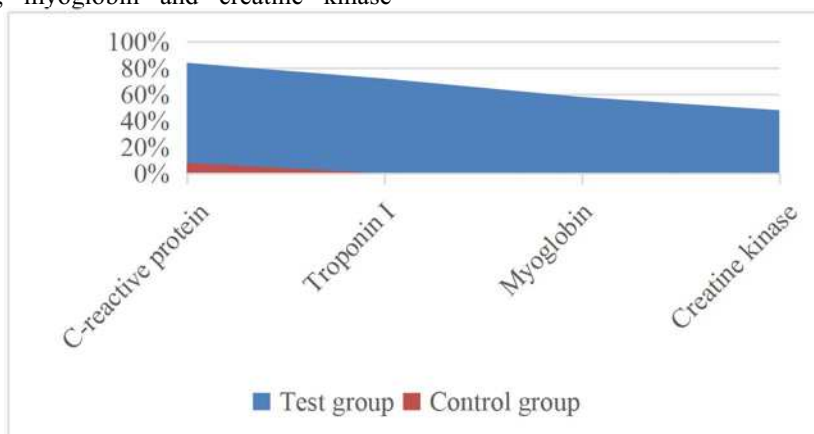


Figure 1. Comparison of isozyme positive rates between the two groups.

Troponin is a marker of myocardial infarction. Troponin increased in 3-5 hours, peaked in 13-37 hours and lasted for 9 days. Its sensitivity is 96% and

specificity is 99%. It is the best marker of myocardial infarction. The influence of cardiac markers and high sensitive CRP in patients with acute myocardial

infarction will lead to the occurrence of the disease. The results of high sensitive CRP in patients with acute myocardial infarction were more than 8, which exceeded the normal index. This may be due to the abnormal cardiac markers, resulting in the increase of CRP test results. The increase of CRP can cause acute inflammatory reaction, and form cardiovascular atherosclerosis and acute myocardial infarction.

5. Conclusions

In this paper, 50 patients with acute myocardial infarction and 50 healthy people were selected to study the application of serum high-sensitivity C-reactive protein in the detection of cardiac markers. Through the study of CRP, the experimental group was (21.57 ± 1.50), (37.62 ± 1.66), (529.20 ± 5.72), (95.79 ± 6.24) ng / ml, the control group was (0.90 ± 1.10), (1.71 ± 0.14), (35.25 ± 4.21), (0.99 ± 0.71) ng / ml, and the difference between the two groups was statistically significant ($P < 0.05$). The abnormality of cardiac markers was observed, and the effect of CRP level change on the condition was analyzed to a certain extent. It was also an acute heart disease Main monitoring items of patients with myocardial infarction.

References

1. Laura CT, Eliana M, María S, *et al.* Detection of reactive oxygen and nitrogen species (ROS/RNS) during hypersensitive cell death. *Plant Programmed Cell Death* 2018; 116(6): 97-105. doi: 10.1007/978-1-4939-7668-3_9.
2. Masayuki T. High-sensitive C-reactive protein in primary aldosteronism. *Journal of Hypertension* 2017; 35(1): 200. doi:10.1097/HJH.0000000000001163.
3. Reihane J, Elham K. Level of high sensitive C-reactive protein and procalcitonin in pregnant women with mild and severe preeclampsia. *Advanced Biomedical Research* 2017; 6(1): 140. doi: 10.4103/2277-9175.218032.
4. Luigi R, Nick AB, Antoine M. Ultra-high sensitive C-reactive protein during normal pregnancy and in preeclampsia: a pilot study. *Journal of Hypertension* 2019; 37(5): 1. doi: 10.1097/HJH.0000000000002003.
5. L. Ziyun, L. Bo, J. Ye. Association between serum uric acid levels and high sensitive C-reactive protein in patients with type 2 diabetes. *Zhonghua Yi Xue Za Zhi* 2017; 97(28): 2181-2185. doi: 10.3760/cma.j.issn.0376-2491.2017.28.005.
6. Boyapati R, Chinthalani S, Ramiseti A, *et al.* Association of pentraxin and high-sensitive C-reactive protein as inflammatory biomarkers in patients with chronic periodontitis and peripheral arterial disease. *Journal of Indian Society of Periodontology* 2018; 22(2): 112-115.
7. Aidin L, Behzad E. The role of supplements in reducing cardiovascular events by decrease in highly sensitive C-reactive protein and serum homocysteine. *Saudi Journal of Kidney Diseases & Transplantation* 2017; 28(6): 1451. doi: 10.4103/1319-2442.220853.
8. Kaur M. C-reactive protein: A prognostic indicator. *International Journal of Applied & Basic Medical Research* 2017; 7(2): 83-84. doi: 10.4103/ijabmr.IJABMR_63_17.
9. Dimitrios V, Nikolaos P, Ioanna K. C-reactive protein and frailty in the elderly: A literature review. *Journal of Clinical Medicine Research* 2017; 9(6): 461-465. doi: 10.14740/jocmr2959w.
10. Sujaya G, Shaili P, Sushil K. C-reactive protein in periodontitis and its comparison with body mass index and smoking behaviour. *Journal of the Nepal Medical Association* 2017; 55(206): 226-233. doi: 10.31729/jnma.3134.
11. Jonathan B, Chris TL. Heart fat in HIV: Marker or mediator of risk?. *Current Opinion in Hiv & Aids* 2017; 12(6): 1. doi: 10.1097/COH.0000000000000414.
12. Moczulska B, Kubiak M, Bryczkowska A, *et al.* Pulse wave velocity as an early marker of diastolic heart failure in patients with hypertension. *Polski Merkuriusz Lekarski Organ Polskiego* 2017; 42(250): 142-144.

Application Research and Practice of TBL Innovative Teaching Method in the Course of Clinical Biochemical Testing Technology

Hongxia Gao, Yan Liu, Guoqing Wang*

Beihua University, Changchun 130122, Jilin, China. E-mail: 450073250@qq.com

Abstract: The purpose of this study is to explore the practical application effect of TBL innovative teaching method in the course of clinical biochemistry test technology. The research object is all undergraduate students in the laboratory major of 2018 medical school of our university. The research method is comparative experiment method, the teaching method of LBL teaching is set as control group, while the experimental group adopts TBL teaching method. By the final teaching evaluation and the data collected in the process, the influence of TBL teaching methods on the teaching effect of the course is compared and analyzed. The evaluation methods are combined with subjective and objective evaluation. The evaluation methods include questionnaire, student mutual evaluation, final test and other multiple ways. And the results of this study showed that the average score of the experimental group using TBL teaching method was significantly higher than that of the control group using traditional teaching method. In addition, through the process evaluation, it was found that the students in the experimental group were superior to the students in the control group in terms of learning interest, communication ability and learning methods. As a result, the application of TBL teaching method in the teaching of clinical biochemistry test obviously promotes the teaching quality and effect of this course.

Keywords: TBL Teaching Method; Clinical Biochemical Testing Technology; Application and Practice

Clinical biochemistry test technology is an important course in modern medicine, and it is also a professional course of medical laboratory specialty^[1]. Its curriculum content is characterized by a wide range of knowledge points, more abstract knowledge and not easy to understand^[2]. The teaching methods often used in medical teaching are: LBL、CBL、PBL、TBL、RBL, and TBL teaching combines many advanced ideas and methods in the PBL、CBL, and pays more attention to team learning and students' creativity than other methods^[3]. Since the beginning of this century, TBL teaching method has been widely used in medical courses in Europe and America. Extensive teaching

examples have also confirmed the advantages of this teaching method. Many colleges and universities in China are carrying out research and experiments on TBL teaching methods, such as integrating case teaching, situational teaching, flipping classroom and so on with TBL teaching according to different teaching contents, which is not only helpful for the students to study the theory deeply, to understand the future professional work deeply, but also to cultivate the students' comprehensive qualities such as practical vocational skills and innovation, which is very important for the future work of modern medical students.

1. An overview of the application of TBL innovative teaching method to clinical biochemical testing technology

Clinical biochemistry test technology is a highly cross-disciplinary subject that integrates knowledge of chemistry, clinical medicine, biology and chemical detection^[4]. The course is based on basic medicine, biology and chemistry, on which to study biochemical markers related to prevention, diagnosis, treatment of diseases and prognosis care, and to study the techniques and methods of detecting these markers, which provide scientific basis for diagnosis, treatment of diseases and other processes, so it is also highly applicable and operational. In 2013, the Ministry of Education made a major adjustment in the training objectives, methods and academic system of the medical laboratory specialty. The school system was changed to four years, and the teaching training target was the laboratory technician. Because of the change of training goal, the teaching content and emphasis of this course also change and shift. Nowadays, the teaching of this course in many colleges and universities pays more attention to the teaching of testing items and testing techniques. In the premise of satisfying the comprehensive goal and development of the subject, more attention is paid to the cultivation of students' knowledge application ability and practical ability. And the traditional teaching method is not suitable for the current teaching of the course, some colleges and universities began to actively try PBL, TBL and other teaching methods.

PBL teaching method was first developed by an American medical professor in 1969, which emphasizes problem-based teaching to guide students to master knowledge and solve problems actively. Teachers play more auxiliary roles in teaching and promote students to explore problems better by creating situations. PBL is very popular and common in the current teaching; and the CBL teaching method is also common in the medical curriculum, which is based on case-based knowledge to teach clinical cases and encourage students to apply clinical knowledge to practice^[5,6].

The TBL teaching mode explored in this paper

emphasizes learning new lessons and exploring problems with the team as the unit, which can be said to put forward a new learning model based on the integration of PBL and CBL core ideas. Created by American Larry Michaelsen professors, the method encourages students to team-oriented learning, memory and practice, and emphasizes cooperation and communication within and between groups. This way of learning together helps modern medical students to participate more actively in case-solving, practical inquiry and other learning links. TBL teaching is divided into three stages: preparation, application and evaluation. Students complete their study preparation before class, mainly including reading and autonomous learning to the death of textbooks. Teachers test students' preparation through discussion at the beginning of class. The application stage is that teachers bring cases, throw questions, students in groups, groups in the class for autonomous and free discussion to solve problems and integrate new knowledge with old knowledge. TBL teaching method does not need more teaching resources than the traditional mode, but it is of great help to the improvement of students' learning, practical ability and comprehensive quality of thinking and innovation, and the effect of application in the teaching of some contents is due to PBL and other teaching methods^[7,8].

2. Research object, research method and teaching content selection

2.1 Research object

The students of many classes of clinical laboratory major of grade 2018 in our medical school were selected as the object of comparative teaching research. There was no difference in the overall scores of each class before the experiment, the average score of the class in the control group was 75.3 points in the last semester, and the comprehensive score of the experimental group was 74.8 points in the last semester. There was no significant difference in the total number and gender distribution between the two groups, and the teaching materials, class hours and teaching resources allocated were basically the same.

2.2 Research method

2.2.1 Teaching experiment methods

The experimental study period is one semester, while the control group still is traditional teaching, while the experimental group is TBL. The teaching methods of the control group are not repeated, and the teaching process of the experimental group is as follows: (1) Reasonable division of teams. The class size is about 50 people, a group of about 8 people, a total of 6 groups, the grouping standard is the comprehensive evaluation of the school period, the division takes into account the students' character, learning ability, thinking mode and so on, so that each group of students characteristics, comprehensive ability equal, the different levels of students equally divided into each group, and consider the possible chemical role between students. Then the team leader is selected by self-recommendation and mutual evaluation in the group, which is responsible for task assignment, discussion organization, recording, extracurricular activities planning and other tasks. (2) Design teaching cases and questions. According to the specific learning content, teachers prepare the appropriate number and strong guidance, more complex cases and related problems, and design each link of teaching, such as situation simulation, problem guidance, so that students in a reasonable range of practice to explore the focus of learning and the stage of preparation of doubts. (3) Testing links. At the beginning of the teaching stage, the students' preparation is tested by individuals and teams, the content is the basic concept of the new class, the key knowledge, the test method is oral quiz, written quiz, and the control time is 5-10 minutes. (4) Explain basic concepts. According to the results of the test, we can explain the missing or puzzled problems in the students' independent preparation flexibly and quickly. (5) Throw out cases and questions to guide students to group discussions. The group leader introduces the problems discussed by the group, then organizes the members to discuss scientifically, then concludes the discussion between groups, and then the members of the class discussion stage explain the results of the discussion. (6) Teachers lead students to conduct specific analysis and evaluation of the discussion process and the results of the problem.

2.2.2 Evaluation method of research effect

The teaching effect of the two groups was evaluated by theoretical examination, summary writing

and questionnaire survey, and combined with the subjective process evaluation of teachers. The theory examination is to let the student carry on the closed paper examination, the examination content contains the new lesson content and the related old knowledge, mainly by the choice question and the case analysis question. Summary writing is to allow students to collect information and write a summary of knowledge after class. The questionnaire survey is after the chapter course, and let the student evaluate the teaching in the form of questionnaire, which is helpful to understand each student's cognition degree, satisfaction degree and opinion on the new teaching method.

2.2.3 Statistical analysis technique

It is necessary to study the concrete influence of different teaching methods on the teaching effect, and use statistical knowledge to carry out data statistics and teaching analysis on the two groups of teaching. The statistical content is theoretical examination results, survey data obtained by questionnaire survey and so on, covering the overall achievement, learning interest, teaching method satisfaction, team writing ability and so on.

2.3 Teaching content selection

Different teaching contents have adapted teaching methods, TBL are not adapted to the teaching of all contents of the course, or need other teaching methods to assist. The course mainly includes detection methods, specific detection items, selection and evaluation and so on, among which detection techniques include metabolic substance testing, organ disease testing and so on. Teaching content is different, the design of teaching time, objectives, assessment is different. This study is the first half of the second school year, students have learned the basic knowledge of medicine, and have a certain understanding and contact with teaching methods such as case analysis, so team learning is not abrupt. In order to guide students to team study by good cases, the study should combine with the teaching arrangement of the course, the current teaching progress and the existing teaching resources, and teaching is mainly carried out with the content of specific test items, such as serum albumin determination, lactate dehydrogenase activity determination and so on. Because the medical examination involves many factors, needs the actual

operation ability, therefore when the research, the teacher comprehensively completes the quality control, then lets the student first take the team as the unit to carry on the experiment inquiry.

3. Key points of the implementation stage of teaching research

3.1 Preparation of teachers and students

The application of TBL teaching in clinical biochemical testing course requires teachers to have sufficient and comprehensive knowledge, subject vision and excellent and comprehensive clinical experience, not only can excellent teaching, because of the flexibility and uncontrollable nature of TBL teaching, but also needs teachers to organize and discuss flexibly and control the teaching process. Therefore, teachers need to make comprehensive and specific preparations. In this study, teachers of this class and related teachers form a thematic group, select typical cases according to the selected teaching contents, involve problems, and strictly control other factors according to the problems, and adjust the cases and problems involved reasonably. In response to the complexity of medical issues, the cluster has made every effort to be fully proactive in its preparation. Write teaching plan as specific as possible, and clear context, reasonable arrangement of time, taking into account the consolidation and application of old knowledge.

Students' preparation mainly refers to the autonomous learning of the new class before class, and collect relevant case materials for independent inquiry. Before class, the teacher arranges the preview task through the class group, and passes the selected case data and the question to the student, the student carries on the targeted inquiry in the offline group according to the existing group, through the literature review, the question analysis and so on, summarizes, records the individual and the team overall result. In the preparation stage, students are allowed to seek help from the teacher within the specified time, and the teacher uses reasonable ways to guide and provide reference materials to help students to better master learning methods, better data collection and more independent inquiry problems.

3.2 Class discussions and inductive reviews

Class discussion takes many ways because of the different content, and different places in the learning stage, such as after the test experiment, the group explores their own discussion results in PPT form, or reproduces the process and results of the inquiry in the form of flipping the classroom. During the discussion, other students can ask questions or supplement the results, and the results show that the team thinks again to answer the questions. In this process, teachers should make relevant records and maintain the order of discussion, and create an overt, respectful and open atmosphere of discussion.

After each group presents the result, the teacher records the result in time and arranges the clear thread, if the team has the question, gives the point, or guides the student to analyze the case clearly, helps the student to find the answer gradually, analyzes the question in own inquiry; moreover, the teacher should carry on the summary, the key point and the confusion question in the discussion.

4. Findings and discussions

4.1 Results of the study

At the end of the experiment, summarize, collate and analyze the information of the evaluation results, and study the results of this comparative experiment. The results of the theoretical results showed that before the implementation of the experiment, the average score of the theoretical examination in the experimental group was 65, and the average score of the theoretical score in the control group was 64. After the application TBL teaching, the theoretical score of the experimental group was obvious and higher than that of the control group, the average score of the control group was 65, while the average score of the experimental group was 78. The scores of students' literature writing were: the average score of experimental group was 80, and the average score of control group was 65, the difference was significant. The objective evaluation results of questionnaire survey showed that the students' interest in learning, team consciousness and teaching satisfaction were higher.

4.2 Discussion on research process and results

Some medical courses in colleges and universities have been trying to TBL teaching, not only clinical biochemical testing courses, through this study also proved that TBL teaching can improve the teaching quality of the course, and can be well combined with LBL、PBL and other teaching methods. Experimental results show that the students improve their theoretical achievement and comprehensive ability by applying TBL to teaching. The reasons are summarized as follows: (1) TBL teaching enables students to communicate in the form of teams, which is beneficial to students to sort out their knowledge structure, form a comprehensive knowledge structure, and learn different inquiry methods quickly; (2) TBL teaching invisibly improves students' autonomous initiative, thus improving their learning efficiency; (3) Because of the reasonable grouping and strict control in teaching, most students can dare to explore and dare to speak, and the completion of the task is better, which also shows that the students are very satisfied with the TBL teaching method.

At the same time, the teaching also found that in the later stage of the implementation of the method, some students' participation decreased, mainly manifested in poor pre-class preparation effect, not active discussion, after communication with students, found that some students think that pre-class preparation, after-class writing and other links occupied their excessive extracurricular time, resulting in a sudden increase in their learning burden, learning interest decline. Secondly, the scores of the two groups of multiple choice questions are not different, which indicates that the teaching link of the theory course is not deep enough or there are some problems such as missing content in the discussion and summary link, or there are cases of design, problems are not comprehensive and so on.

5. Conclusion

Above all, TBL teaching is really helpful to improve the teaching quality of clinical testing courses, but its

requirements for students and teachers are very high, so there are many problems in this study. However, complex and diverse factors may be considered in practical application, and each link should be improved continuously in the future, so that TBL teaching method can be better applied in clinical biochemistry teaching.

References

1. Xu M, Li P, Zhao Y. Study on teaching strategies of biochemistry and biochemistry testing technology (in Chinese). *Laboratory Medicine and Clinic* 2016; 13(21): 3122-3124. doi: 10.3969/j.issn.1672-9455.2016.21.058.
2. Wang L, Su H, Shao H. Research and practice of research, frame and case-based teaching model — Taking the course of clinical biochemistry and biochemistry in higher vocational education as an example (in Chinese). *Continuing Medical Education* 2016. doi: 10.3969/j.issn.1004-6763.2016.07.029.
3. Cao C. Current situation and reform analysis of the teaching of biochemistry test (in Chinese). *Chinese and Foreign Communication* 2017; (21): 89.
4. Xu Z, Chu M. Design and implementation of comprehensive training in biochemical testing (in Chinese). *Chinese Journal of Health Laboratory Technology* 2018; 28(2): 252-253+256.
5. Zhang X, Yao H, Hao C, *et al.* Application of PBL and CBL teaching method in teaching clinical biochemistry test (in Chinese). *The Chemistry of Life* 2020; 1-4.
6. Zhang Y, Wang D, Guo S, *et al.* A probe into the teaching reform of clinical biochemical testing technology course in four-year laboratory (in Chinese). *The Journal of Medical Theory and Practice* 2019; 32(15): 2491-2493.
7. Wang Y, Yang Y, Yi W, *et al.* Exploration on the reform of experimental teaching of "clinical biochemistry testing technology" for comprehensive practice ability (in Chinese). *Journal of Chengdu University of Traditional Chinese Medicine (Educational Science Edition)* 2019; 21(1): 39-41.
8. Chen C, Ma K, Bei Z, *et al.* Research and discussion on the teaching mode of "school and college in one" course of biochemical examination in medical laboratory technology specialty (in Chinese). *Course Education Research* 2018; (40): 247.

Thinking and Discussion on Nursing Mode of New Infectious Diseases

Junping Guo

ShenZhen University General Hospital, China, 518031

Abstract: With the spread of new coronavirus in the world, all countries are facing a serious public health security crisis. How to effectively deal with new infectious diseases has become a hot topic of research and discussion. Based on this, this paper first studies the self-protection of nursing staff under the new infectious disease epidemic situation, then analyses the nursing strategies of the new infectious disease epidemic situation, and finally gives the management strategies and suggestions for the new infectious disease epidemic situation nursing.

Keywords: Nursing Mode; New Infectious Diseases

1. Introduction

Emerging infectious diseases have become one of the major issues of current regional or international public health concern, which often have several characteristics as shown in **Figure 1** below. At present, novel coronavirus has been attacked all over the world and has become the most serious public health safety event.

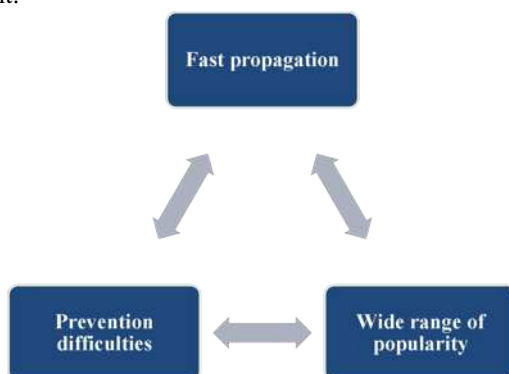


Figure 1. Characteristics of emerging infectious diseases.

The novel coronavirus outbreak in 2019, which is a new infectious disease, has significant characteristics such as unknown pathogen, aggressive and rapid

development. It has caused great impact and loss on the world and the global economy. As a counter to the outbreak of infectious diseases, nurses are an important force to deal with new infectious diseases. In order to actively treat patients, reduce mortality, strictly control the source of infection, cut off the route of transmission, actively and effectively respond to new infectious diseases and protect the safety of medical staff, we must formulate scientific and reasonable nursing plans and procedures, and improve timely disinfection, isolation and safety protection measures, so as to cope with the more effective completion of the nursing task of new infectious diseases. Therefore, the research on the nursing of new infectious diseases is of great practical significance in the current situation of new coronavirus.

2. Self-protection of nursing staff under the new infectious diseases

2.1 Priority allocation of protective equipment for nursing staff

At the time of the outbreak of the new crown epi-

demic, in order to ensure the safety of the nursing staff, they must enter the cleaning area through the special passage of the staff, carefully wash their hands and wear medical protective masks, disposable hats, work shoes, socks and protective clothing in turn, and carry out timely needs assessment of the protective materials.

Taking the novel coronavirus infectious disease demand assessment as an example, the priority of the protective supplies needed by medical staff and the allocation of the supply list should be determined based on the difference of the diagnosis and treatment places, as shown in **Table 1** below.

Deployment priority	Clinics	Protection level	Protective equipment required
Class I	Fever clinic	Level III protection	Work clothes, work caps, masks, protective clothing, goggles, gloves
	Isolation ward		
Class II	ENT clinic	Level II protection	Work clothes, work caps, masks, disposable isolation clothing, goggles, gloves
	Fever triage		
	Respiratory tract specimen collection		
Class III	Preview triage	Level I protection	Work clothes, work caps, masks, disposable isolation clothing, goggles, gloves
	Respiratory clinic		
	Infection clinic		
Class IV	Other clinical departments	General protection	Work clothes, work caps, medical surgical masks
Class V	Other staff		Surgical mask

Table 1. Priority allocation of protective equipment for nursing staff

First of all, the emergency management of protective materials requires a reasonable formula, which is managed by a specially assigned person and accounted by post and level. Secondly, carry out zero inventory management to facilitate the overall coordination and management, and propose to save and prevent over protection. In addition, it need to carry out dynamic monitoring and adjustment, timely adjust the reserve of protective materials, and dynamically adjust the reserve of protective materials based on the assessment results of the new crown epidemic situation, so as to put an end to the shortage of materials. Establish an information management system for protective materials to ensure that the deployment process of all materials is open, transparent and traceable.

2.2 Actively carry out special nursing training

First of all, novel coronavirus pneumonia should be correctly understood by nursing staff, and the ability of nursing staff to deal with new infectious diseases should be improved, and the quality of nursing and the safety of nursing staff should be guaranteed. Secondly, it

is necessary to evaluate the training needs and determine the training methods according to the content of training needs. Novel coronavirus pneumonia training programs should be developed to provide new knowledge and skills. In addition, nursing and department level training should be carried out. In order to avoid the aggregation of personnel caused by training, online training should be adopted to organize online course training. In order to ensure the effect of training and the occupational safety of nursing staff, dynamic assessment should be carried out by grading and classifying.

3. Nursing strategies for new infectious diseases

Taking the new coronavirus as an example, it spreads widely and rapidly, which brings serious challenges and threats to front-line medical staff. Therefore, it should establish a perfect emergency mechanism, enhance the response awareness of medical staff, and provide effective support to strengthen the construction, as shown in **Figure 2**, so as to ensure an effective response to the outbreak.

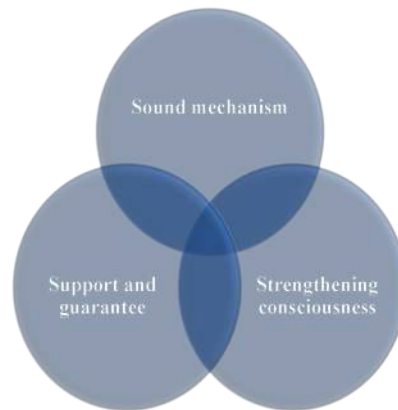


Figure 2.

3. Nursing strategies for new infectious diseases

3.1 Establish a sound emergency mechanism for new infectious diseases

It is necessary to establish a comprehensive pre examination and triage mechanism for new infectious diseases. The early diagnosis and detection of new infectious diseases are often difficult and easy to be misdiagnosed as other diseases. The novel coronavirus pneumonia caused by the new crown virus was taken as an example in the early stage, and was misdiagnosed as common cold. It was considered that no human transmission could be made, resulting in the delay of the best protection time and the large area of human infection. This also shows that new infectious diseases often need a gradual cognitive process, but if this process is too long, it will lead to serious consequences. The new coronavirus is due to the lack of necessary cognition in the early stage, leading to a large number of medical staff infections, resulting in significant personnel loss. The establishment of a scientific and reasonable outpatient pre examination mechanism can effectively identify and detect new infectious diseases based on the triage process, so as to take timely response measures to avoid the large-scale spread of the epidemic.

3.2 Construction of strict isolation and protection mechanism

The construction of strict isolation and protection mechanism is an effective measure to prevent the spread of new infectious diseases. Take this outbreak of new coronavirus as an example. Since China has established a

strict isolation and protection mechanism after the outbreak, it only took more than two months to completely control the outbreak. On the contrary, due to the construction of isolation and protection mechanism ignored by some foreign countries, the number of people infected with the disease increased exponentially. It can be seen that strict isolation and protection is the most effective way to organize the spread of new infectious diseases. Not only that, but also based on the transmission route and infectivity of new infectious diseases, the level standard of isolation and protection mechanism should be constructed to protect medical staff and prevent cross infection.

In addition, in the face of new infectious diseases, we should strictly implement the disinfection mechanism, so as to effectively cut off the transmission of infectious diseases. The medical staff should strictly implement the nursing standards, strictly standardize the operation based on the epidemic diagnosis and treatment process, improve the nursing effect and improve the effective control of the epidemic.

4. Management strategy of nursing for new infectious diseases

4.1 Strengthen the management system and make quick response mechanism

First of all, it should make a scientific and reasonable emergency response plan, quickly establish the emergency nursing team, and formulate the emergency organization and guarantee system. Secondly, it should establish a scientific and transparent information support system to ensure the openness and transparency of epidemic information, prevent the panic

of the population and achieve scientific protection. In addition, it should ensure the sufficiency of nursing resources and prevent the shortage of anti-epidemic materials. For example, in the early stage of the outbreak of the new coronavirus, the lack of masks led to a large number of hospital medical staff not being well protected, leading to many medical staff being infected, so it is necessary to establish adequate and reasonable resource planning and allocation mechanism.

4.2 Training the comprehensive ability of nursing staff

Establish and strengthen the disease prevention and control system to improve the basis of dealing with new infectious diseases. Therefore, in the daily work of infectious disease nursing, it is necessary to carry out continuous and regular training and drills for nurses to deal with the new infectious disease epidemic situation, so as to exercise the coping ability of nurses. In addition, it should strengthen the maintenance of the psychological state of nursing staff, improve their ability to resist pressure when the crisis broke out, so that they can enhance their proficiency in cooperation with all aspects based on the requirements of the established plan, and play the role of anti-epidemic to the maximum extent.

5. Conclusions

As counters to the outbreak of infectious diseases,

nurses are an important force to deal with new infectious diseases. Taking the outbreak of novel coronavirus as an example, this paper points out that a new emergency mechanism for new infectious diseases should be established and a strict isolation protection mechanism should be established under the new infectious disease epidemic situation. And strengthen the construction of management system, improve the ability to deal with emergencies, cultivate the comprehensive ability of nursing staff, so that the new infectious diseases could be quickly controlled and improved.

References

1. Guo J. Prevention and control of new infectious diseases. Beijing: China Union Medical University Press, 2002, 423-431.
2. Zhang C. Characteristics of new infectious diseases and current situation of disinfection and isolation. Chinese Journal of Nursing 2008; 43 (2): 164.
3. Wang Y, Hu S. New infectious diseases. Beijing: Science and Technology Literature Press, 2006: 43-45.
4. Yi Bin. Isolation and protection of respiratory infectious diseases. Chinese Journal of Nursing 2005;40 (3): 238.
5. Yang X, Li S, Hua L, *et al.* Organization and management of SARS Ward in general hospital. Chinese Journal of Nursing 2003; 38 (7): 546.
6. Yu Y, Qi B, Jin N, *et al.* Organization and management of emergency response in hospital nursing department. Zhonghua Journal of Nursing 2003; 38 (7): 5

An Experimental Study on the Establishment of Pulmonary Hypertension Model in Rats induced by Monocrotaline

Zhongshuang Zhang^{1*}, Xiaoyong Song², Zhengyong Zhao³, Jiazheng Xu¹, Shu Luo¹, Jiawang Ma¹, Ruiyang Zhao¹, Jiahao Fu¹, Xudong Wang¹, Wenxin Zhu¹, Yaohui Hu¹, Chunyuan Xue¹, Yongxiang Liu¹, Jinniu Guo¹, Ruihong Lu¹, Youzhi Wu¹, Wenxing Gao¹, Bowen Wu¹, Wenwei Li¹, Guohong Gong¹, Runze Shi¹, Guangsen Lu¹

¹Shihezi University, Shihezi City 832000, China. E-mail: zhangzhongshuang@shzu.edu.cn

²Friendship Hospital, Urumqi City 830000, China.

³Unit 69006 of PLA, Urumqi City 830000, China.

Abstract: Pulmonary hypertension is called PH for short. It is caused by the pulmonary artery vascular disease leading to pulmonary vascular resistance, and the increase right lung compartment load, which resulting in weakening or even collapse of the right ventricular function. The establishment of rat PH model under the action of monocrotaline is a repeatable, simple and accessible operation technique, which has been widely used in the treatment of pulmonary hypertension. This paper discusses the principle and properties of the PH model on rats under the monocrotaline action.

Keywords: Monocrotaline; Induction; Pulmonary Hypertension; Model Construction

1. Introduction

Pulmonary hypertension is caused by an abnormal increase in pulmonary blood pressure. The hemodynamic criterion to identify the disease is measuring the average pulmonary artery pressure of the right cardiac catheter based on sea level and it should not be lower than 25mm Hg in a calm state. This disease is generally appeared because of pulmonary vascular lesions, which increase pulmonary vascular pressure and right ventricular after load, resulting in the weakening of the right ventricular or even dysfunction.^[1] The rats with pulmonary hypertension formed under the monocrotaline action are the ideal animal model for studying this disease so far. Monocrotaline is a kind of bipyrrrole alkaloid. After it enters animal liver, it will undergo certain biological enzyme transformation, flow through with the blood to the lungs in the body, and cause

damage to the blood vessels in the lungs, resulting in inflammation of the blood vessels. This reaction is similar to the clinicopathological mechanism.^[2]

After years of researches, people have new insights towards the disease mechanism, but it still takes time to fully understand the disease mechanism. A detailed description of the disease's pathology is key to achieving optimal productions, and PH animal models play an important role in this process. Rat PH established by the monocrotaline action under chronic hypoxia can be utilized to study human PH. The mechanism of some vascular lesions provoked by hypoxia is generally mastered, while the circumstances of PH disease patients with vascular blockage have not been found in the rat model. The rat PH model technology developed under the MCT action mechanism is characterized by repeatability, low cost and simple operation, which is the reason it is often applied in PH experiments.

2. Pulmonary hypertension model induced by monocrotaline

The rats with pulmonary hypertension formed under the action of monocrotaline are an ideal animal model for the pulmonary hypertension study. Monocrotaline is a kind of bipyrrrole alkaloid, which reacts with oxidase in the liver with the blood flow to the lungs causing damage to the pulmonary artery vessels, and this damage is irreversible. There is a target cell called the endovascular cell in the pulmonary artery, which is very significant for the pulmonary artery. According to rats produced by monocrotaline PAH lung tissue pathology model, monocrotaline injection into animals will lead to the swell phenomenon of pulmonary artery endothelial cells in one week, and under electron microscope it can be observed that the electron density decreases, the nucleus will further increase, the cell membrane become thicker, organelles are swollen again, and all these phenomenon lead to the dysfunction of endothelial cell and it gradually fall off. It can be seen by light microscopy that the endothelial cells of pulmonary artery vessels transform from their original flat state to a stereoscopic state and protrude towards the lumen. After two or three weeks, some of the endothelial cells of the pulmonary artery vessels demonstrated necrosis or even shedding in animals, and the pulmonary artery vessels manifested fibrosis and sclerosis, resulting in narrowing of the pulmonary artery vessels, thrombosis and blockage.

Another consequence is the imbalance between the downstream vasodilatation and constriction of vessels, leading to increased pressure in the pulmonary artery and added pulmonary vascular resistance. In addition, in the process of monocrotaline induced pulmonary artery pressure, inflammation plays an important role and it embodies in the following aspects in particular: firstly, by the study of the monocrotaline pathology model observation it can be found that number of inflammatory cells infiltrate in model lung tissue, which is similar to the vasculitis symptoms and it is mainly around the blood vessels; secondly, the increase of plasma proinflammatory factors in the monocrotaline model was large, of which the tumor necrosis factor was more obvious; thirdly, the utilization of cyclophosphamide for preventive intervention can effectively reduce the level of some inflammatory factors

on the culture medium of alveolar macrophages in the monocrotaline model, such as interleukin 1, tumor necrosis factor and interleukin 6. Finally, the infiltrating and proliferating cells present in the lung tissue of monocrotaline model were mostly mononuclear cells, with a small number of T or B lymphocytes. Therefore, nonspecific inflammation containing macrophages had an important effect, pulmonary arterioles and capillaries will be damaged by monocrotaline, and then monocrotaline infused into alveolar interval induced alveolar macrophage phagocytosis. In the meanwhile the interleukin 1, tumor necrosis factor alpha and interleukin 6 proinflammatory factor used cascade amplification reaction, and make the blood vessel walls and alveolar interval by inflammatory cells infiltration with mononuclear scavenger system activation repeatedly. This increases the thickness of the vessel walls and alveolar septa, and promoted the resistance of the pulmonary vessels. Inflammatory response has important impacts in the pathogenesis of the rat model of pulmonary hypertension induced by monocrotaline. Therefore, this model can be regarded as an animal model closely related to the pathogenesis of connective tissue-related pulmonary hypertension. At present, there is no better model can be put into use, and it is the optimal option based on practical application of the model concerning monocrotaline-induced pulmonary hypertension in rats to study the pathogenesis and drug intervention of connective tissue-related pulmonary hypertension.

3. Experimental study on pulmonary hypertension induced by monocrotaline

3.1 Experimental methods

(1) Grouping and modeling: 60 rats were randomly divided into the control group (n=12) and the model group (n=48). After 1 week adaptive feeding, 60mg/kg subcutaneous injection of monocrotaline was carried out in the model group, and then the hemodynamic indexes were measured for 1, 2, 3 and 4 weeks with specimens collected. 12 rats were collected at 4 different time points. In the control group, the same amount of normal saline was injected subcutaneously, and the pressure was

measured again after 4 weeks of the injection, and then the data were extracted.^[3]

(2) Observe the basic conditions of rats: mainly observe the feeding and activity of rats after injection of monocrotaline, as well as the presence or absence of infection and death, and weigh the rats after 4 weeks.

(3) Hemodynamic measurements: mean pulmonary artery pressure was measured at week 1, 2, 3, and 4, respectively, after injection of monocrotaline. Thoracotomy was performed by placing a catheter in the pulmonary artery via the right ventricle.

(4) Detection of right ventricular hypertrophy: the rat heart was completely cut off, and after the atrial tissue was removed, the A ventricle (RV) and the left ventricle (LV) plus ventricular septum (LV+S) were separated, the water was sucked dry with A filter paper, then the weight was weighed and the RV/(LV+S) value was calculated.

(5) Detection of pulmonary vascular micro-morphological indicators: the lung tissues were fixed in negative pressure neutral formaldehyde for 24 hours, paraffin sections were prepared, and routine hematoxylin-eosin staining was performed. Pulmonary vascular morphology was observed under light microscope in both groups. Calculation: 1. CMIAS image processing and analysis system was used to calculate the relative thickness of the medium (external diameter 50 ~ 150 μ m) and small (external diameter 15 ~ 50 μ m) muscular arteries. 2. Pulmonary vessel density per unit area (per /mm).²

(6) Main observation indicators: changes of right ventricular hypertrophy level, pulmonary vascular micro-morphological indicators and hemodynamic indicators in rats.

(7) Statistical analysis: statistical analysis was carried out with the assistance of SPSS13.0 statistical software, and the data were presented as $\bar{x} \pm s$. $P < 0.05$ was considered significant.

3.2 Discussion of experimental results

Inflammatory response plays a key role in the pulmonary hypertension induced by monocrotaline. Observation of the choline induced model pathology showed that there was a large number of inflammatory cell infiltration in the lung tissue of the model, which was similar to the symptoms of vasculitis and mainly distributed around the blood vessels. Plasma

proinflammatory cytokines in the model increased significantly.

After 4 weeks of administration, the right ventricle became hypertrophic and pulmonary artery pressure increased significantly. Pulmonary vascular remodeling, such as thickening of the middle membrane of the pulmonary artery, increased myogenesis degree. And intimal hyperplasia also appeared, which indicated that an effective pulmonary hypertension model could be established by induction of monocrotaline injection.^[4] Injecting monocrotaline into animals can reduce the pulmonary vascular bed of animals and increase the residual pulmonary blood flow, which is the same as the changes in the pathological morphology of some blood vessels such as pulmonary fibrosis, chronic obstructive pulmonary disease and pulmonary embolism. When the pulmonary vascular endothelium is injured, the monocrotaline is selective and will lead to chronic vascular inflammatory lesions. Compared with the model of chronic hypoxia, this model is closer to the actual clinical causes. In addition, the experimental model of pulmonary hypertension in rats has better control over the pathological process with lower mortality rate, simple operation, and strong repeatability, which has good promotion and application value.

4. Conclusion

Inflammatory response plays an important role in the pathogenesis of the rat model of pulmonary hypertension induced by monocrotaline. To some extent, this model can be regarded as an animal model closely associated with the pathogenesis of connective tissue-related pulmonary hypertension. From the practical standpoint, it is a rational choice to study the pathogenesis and drug intervention of connective tissue-related pulmonary hypertension in rats by using monocrotaline model until a more suitable model is developed.

References

1. Qiu S, Huang S. Study on the mechanism of wild liliun induced pulmonary hypertension in animal model (in Chinese). *China Medical Innovation* 2016; 13(17): 142-145.
2. Li B, He W. Theoretical research and preparation characteristics of animal model of pulmonary hypertension (in Chinese). *Chinese Journal of*

- Tissue Engineering Research 2010; 14(11): 2039-2042.
3. Wang J, Yang D, Li Z, *et al.* Establishment of rat model of pulmonary hypertension induced by liliun (in Chinese). Chinese Journal of Tissue Engineering Research 2011; 15(28): 5237-5240.
 4. Yang L, Chen D, Zhou D. Establishment of pulmonary arterial hypertension model in rats induced by different doses of choline (in Chinese). Chinese Journal of Clinical Pharmacy 2008; 27(1): 36-39.
 5. Dong L, Chen P, Cheng J. Experimental study on pulmonary arterial hypertension induced by different doses of choline in rats (in Chinese). Chinese Journal of Integrative Medicine on Cardio Cerebrovascular Disease 2015; 13(10): 1172-1175.
 6. Zhu J, Chen H, Zhao X, *et al.* Effect of monophosphate induced pulmonary hypertension on the expression of hippo signaling pathway in rats (in Chinese). Chinese Journal of Pathophysiology; 35(7): 1333-1338.

Analysis of Clinical Effects of Huangqi Maidong Decoction Combined with Insulin Aspart Injection in the Treatment of Gestational Diabetes

Zhuo Liu*

Guangxi University of Traditional Chinese Medicine, Nanning 530011, China. E-mail: daphne0825@163.com

Abstract: Objective: This article mainly explores the therapeutic effect of Huangqi Maidong Decoction combined with aspart insulin injection on patients with gestational diabetes. Methods: The study period was from January 20, 2017 to December 15, 2018. A total of 156 patients with gestational diabetes mellitus admitted in this hospital were selected and grouped by the randomization principle. They were grouped by randomization into the Chinese medicine group (n = 52 cases), the western medicine group (n = 52 cases) and the study group (n = 52 cases), and patients in the Chinese medicine group were treated with Huangqi Maidong Decoction. Patients in the western medicine group were treated with aspart insulin injection. And patients in the study group were treated with Huangqi Maidong Decoction combined with aspart insulin injection to help patients to recover. Four weeks are taken as a course of treatment. After one course of treatment, the three groups of patients were compared for blood glucose control and delivery mode. It is impossible to predict the outcome of pregnancy and the corresponding results. After one course of treatment, the blood glucose control, delivery mode and pregnancy outcome of the study group was better than those of the traditional Chinese medicine group and western medicine group, which was statistically significant ($P < 0.05$). And asphyxia occurred in the study group after the intervention. Pneumonia and hypoglycemia were significantly less than those in the traditional Chinese medicine group and the western medicine group with statistical significance ($P < 0.05$). Conclusion: In the clinical treatment of gestational diabetic patients, the clinical effect of Huangqi Maidong Decoction combined with aspart insulin injection is obvious. It can control the blood sugar of the patient, promote the natural delivery of the mother, and improve the pregnancy outcome and newborn outcome to ensure the safety of mothers and infants.

Keywords: Huangqi Maidong Decoction; Insulin Aspart Injection; Gestational Diabetes; Clinical Effect

1. Conclusion

Gestational diabetes, gestational diabetes mellitus (GDM) is a kind of very common current clinical pregnancy complications, and it is a type of diabetes.^[1] If not treated and controlled, fetal deformity and death will increase significantly, newborns may also suffer from complications such as hypoglycemia and macrosomia, and may even lead to maternal dystocia or death.^[2,3]

Some studies have shown that the probability of gestational diabetes in China's pregnant women is about 1%-5%. With the continuous improvement of people's living standard in recent years, the incidence of GDM has been on the rise year by year.^[4, 5] At present, the clinical treatment for gestational diabetes is mainly to adjust the diet and exercise of pregnant women, or to follow the doctor's advice to take oral hypoglycemic drugs, such as metformin. However, as the pathogenesis of the disease

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doi: 10.18686/aem.v9i1.159

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is complex and the onset period is relatively special, the simple use of western medicine to control blood sugar is not ideal.^[6] In recent years, with the development of Chinese medicine, the application of TCM in the treatment of GDM has attracted more and more attention.^[7] Gestational diabetes belongs to the category of "relieving thirst during pregnancy" in traditional Chinese medicine. The main cause of the disease is that due to the diet of pregnant women and the accumulation of energy and blood to nourish the fetus, and the deficiency of maternal energy and Yin causes the disease. Astragalus ophiopogonis decoction is a common prescription of nourishing Yin and energy in traditional Chinese medicine.^[8] In this study, 156 pregnant women with gestational diabetes admitted to our hospital from January 20, 2017 to December 15, 2018 were randomly divided into TCM group (n=52 cases), western group (n=52 cases) and research group (n=52 cases). The pregnant women in the Chinese medicine group were treated with astragalus ophiopogonis decoction, and the pregnant women in the western medicine group were treated with Mendong insulin injection. On this basis, the pregnant women in the research group were treated with astragalus ophiopogonis decoction and Mendong insulin injection to help them control their blood sugar. Four weeks is a course of treatment. After a course of treatment, observing the nutritional status and various indicators of the three groups of pregnant women, in order to explore the effect of Huangqi Maidong decoction and Mendong insulin injection on the treatment of pregnant women with gestational diabetes, and the details are reported below.

2. Materials and methods

2.1 General information

The study was conducted from January 20, 2017 to December 15, 2018. 156 pregnant women with gestational diabetes admitted to our hospital were randomly divided into Chinese medicine group (n=52 cases), western medicine group (n=52 cases) and research group (n=52 cases).

In the TCM group, 52 patients were aged 24-38 years, with an average age of 29.79 ± 2.48 years. The average weight was (65.25 ± 9.66) kg. Gestational weeks were 24-34 weeks, with an average of 29.37 ± 1.33 weeks.

In the western medicine group, 52 patients were aged 20-38 years, with an average age of 25.79 ± 2.32 years. The average weight was (60.25 ± 8.56) kg. Gestational age was 25-35 weeks, with an average of 29.53 ± 1.32 weeks.

Fifty-two patients in the study group were aged 23-39 years with an average age of (30.12 ± 3.01) years. The body weight was 44-87kg, and the average weight was (65.67 ± 9.52) kg. Gestational weeks ranged from 24 to 34 weeks with an average of 29.19 ± 1.28 weeks.

In order to ensure the rigor of the data in this study, the consent of pregnant women had been obtained before the survey. The comparative analysis of relevant data and the data of pregnant women themselves showed that there was no significant difference in maternal conditions among the three groups ($P > 0.05$).

2.2 Inclusion and exclusion criteria

Inclusion criteria: (1) conform to GDM diagnostic criteria;^[9] (2) sign the "informed consent"; (3) normal and conscious.

Exclusion criteria: (1) the presence of continued pregnancy contraindications; (2) abnormal liver and kidney function; (3) the existence of liver dysfunction or abnormal coagulation mechanism; (4) patients who have been diagnosed with diabetes before pregnancy.

2.3 Methods

In this study, 156 pregnant women were treated with conventional methods, which required them to make a reasonable diet plan for pregnant women according to their blood glucose status, to eat little and often, and to maintain moderate exercise every day.

Chinese medicine group: 52 pregnant women were treated with astragalus ophiopogonis decoction, the prescription was: Astragalus 30g, Ophiopogonis 20g, Chinese Yam 20g, Ejiao 18g, Poria Cocos 20g, Cooked Rehmannia Rehmandii 20g, Schisandrae 12g, Huangjing 10g, Yuzhu 12g.^[10] Method of administration: choose non-decoction traditional Chinese medicine (produced by Jiangsu Jiangyin Tianjiang pharmaceutical co., LTD.), one set per day, rinse with water to 200ml, and take it twice in the morning and evening, 100ml each time.

Western medicine group: 52 pregnant women were treated by subcutaneous injection of Mendong insulin in the islet group. Mendong insulin was selected for

subcutaneous injection of 0.3-0.8 U/kg in pregnant women. Insulin was injected twice a day, one third of the total insulin needed for the day before breakfast and one third of the total insulin needed for the day before dinner. The final step is to adjust insulin dosage according to blood glucose during pregnancy.

Study group: 52 pregnant women were treated with astragalus ophiopogonis decoction and Mendong insulin injection.

The three groups of pregnant women took 4 weeks as a course of treatment, after a course of treatment, the pregnant women's indicators were evaluated in order to observe the application effect of nutrition assessment and special disease integrated diet guidance.

2.4 Evaluation index

After a course of treatment, blood glucose control, pregnancy outcome and neonatal outcome were

compared among the three groups.

2.5 Statistical analysis

SPSS24.0 software was used to expand data processing and measurement data. The expression form was: t test. The enumeration data, expressed in the form of [n (%)], were mainly tested, $P < 0.05$, showing a statistical difference χ^2 .

3. Results

3.1 Comparison of blood glucose control after a course of treatment

After a course of treatment, the blood glucose control of pregnant women in the study group was better than that of the Chinese medicine group and the western medicine group, showing statistical significance ($P < 0.05$). The specific scoring results are shown in **Table 1**.

Group	The number of cases	FPG		2 HPG	
		Baseline	After a period of treatment	Baseline	After a period of treatment
Traditional Chinese Medicine Group	N = 52	7.28 + / - 1.11	4.78 +/- 1.01 ^{ab}	11.37 +/- 1.45	6.98 +/- 0.84 ^{ab}
Western Medicine Group	N = 52	7.26 + / - 1.09	4.98 +/- 1.04 ^{ab}	11.42 +/- 1.49	7.57 +/- 0.85 ^{ab}
Study Group	N = 52	7.31 + / - 1.12	4.19 +/- 0.95 ^a	11.35 +/- 1.43	6.36 +/- 0.64 ^a

Table 1. Blood glucose control in the three groups ($x \pm s$)

Note: Compared with baseline, $P < 0.01$; ^a Compared with the study group, $P < 0.01$.^b

3.2 Comparison of pregnancy outcomes among the three groups after a course of treatment

After a period of treatment, comparing the pregnancy outcomes of pregnant women in the three

groups, it can be found that the pregnancy outcomes of pregnant women in the study group were significantly better than those in the traditional Chinese medicine group and the western medicine group, with statistical significance ($P < 0.05$). The specific results are shown in **Table 2**.

Group	The number of cases	Preeclampsia	Hydramnios	Macrosomia	Preterm Birth
Traditional Chinese Medicine Group	N = 52	6 (11.54)	8 (15.38)	6 (11.54)	3 (5.77)
Western Medicine Group	N = 52	5 (9.62)	9 (17.31)	8 (15.38)	2 (3.85)
Study Group	N = 52	3 (5.77)	4 (7.69)	5 (9.62)	0 (zero)
X ²		14.05	12.96	11.49	8.78
P		< 0.05	< 0.05	< 0.05	< 0.05

Table 2. Comparison of pregnancy outcomes among three groups [n (%)]

3.3 Comparison of neonatal outcomes after a course of treatment

After a course of treatment, the neonatal outcome of

the study group was better than that of the Chinese medicine group and the western medicine group, showing statistical significance ($P < 0.05$). The specific scoring results are shown in **Table 3**.

Group	The number of cases	macrosomia	hypoglycemia	Low blood calcium	hyperbilirubinemia	Fetal death palace
Traditional Chinese Medicine Group	N = 52	8 (15.38)	9 (17.31)	4 (7.69)	7 (13.46)	0
Western Medicine Group	N = 52	7 (13.46)	6 (11.54)	2 (3.84)	5 (9.61)	1 (1.92)
Study Group	N = 52	2 (3.84)	3 (5.77)	0	1 (1.92)	0
X ²		4.03	4.62	3.51	5.78	0.53
P		< 0.05	< 0.05	< 0.05	< 0.05	< 0.05

Table 3. Comparison of neonatal outcomes after a course of treatment among pregnant women in three groups [n (%)]

4. Conclusion

Among the drugs for the treatment of gestational diabetes, insulin is a commonly used drug. Because it cannot pass through the placenta, it is safe for the fetus. Insulin can effectively reduce the blood sugar of pregnant women and improve maternal and infant outcomes.^[11] Mendong insulin is used for the treatment of gestational diabetes mellitus, which is easy to inject, has a good effect on the control of postprandial blood glucose, and can also reduce the risk of hypoglycemia before meals. However, the use of Mendong insulin injection alone cannot achieve the best effect, for example, it cannot improve the discomfort symptoms of pregnant women, such as self-induced dry

mouth and fatigue.^[12, 13]

According to Chinese medicine, gestational diabetes occurs mainly because pregnant women's viscera functions are in a weak state. And after pregnancy, diet is not regular, energy and blood under the accumulation to feed fetus with the continuous growth of the fetus, so the mother's energy and Yin consumption gradually increased, resulting in energy and Yin deficiency of pregnant women.^[14] According to the cause of gestational diabetes, radix astragali ophiopogonis decoction can be used to treat puerpera. Studies have shown that astragalus ophiopogonis decoction can inhibit maternal reactive oxygen free radicals, thereby reducing islet cell damage, and promote insulin secretion.^[15]

Through this study it can be found that after the end

of a course of treatment, use of astragalus membranaceus dwarf lilyturf soup combined insulin treatment of gestational diabetes pregnant women in blood sugar control and maternal and infant outcomes is superior to the traditional Chinese medicine and western medicine group. The differences were statistically significant, $P < 0.05$, and obviously improves the pregnant woman consciousness of some discomfort symptoms. Modern pharmacology shows that the extracts of astragalus polysaccharide and coumarin have the effect of lowering blood sugar. However, the polysaccharide extracted from ophiopogon japonicus can significantly inhibit the glycemic action of epinephrine.^[16]

In conclusion, astragalus ophiopogonis decoction combined with Mendong insulin is effective in the treatment of gestational diabetes. Medical personnel should first help pregnant women to establish a healthy lifestyle, and then refer to the scientific use of drugs for pregnant women.^[17] This not only helps pregnant women control blood sugar index, but also can effectively improve pregnancy outcome, and improve the quality of life of pregnant women. Therefore, astragalus ophiopogonis decoction combined with Mendong insulin is worthy of application and promotion in the treatment of gestational diabetes.

References

1. International Association of Diabetes and Pregnancy Study Groups Consensus Panel, Metzger BE, Gabbe SG, *et al.* International association of diabetes and pregnancy study groups recommendations on the diagnosis and classification of hyperglycemia in pregnancy. *Diabetes Care* 2010; 33: 676-682. doi: 10.2337/dc10-0544.
2. Maghbooli Z, Hossein-nezhad A, Mirzaei K, *et al.* Association between retinol-binding protein 4 concentrations and gestational diabetes mellitus and risk of developing metabolic syndrome after pregnancy. *Reproductive Sciences* 2010; 17(2): 196. doi: 10.1177/1933719109351097.
3. Kuzmicki M, Telejko B, Szamatowicz J, *et al.* High resistin and interleukin-6 levels are associated with gestational diabetes mellitus. *Gynecological Endocrinology* 2009; 25(4): 258-263. doi: 10.1080/09513590802653825.
4. Hu L, Jiang B, Zhang Y. Effects of puerarin combined with insulin aspart on oxidative stress, insulin resistance and pancreatic β -cell function in pregnant women with gestational diabetes mellitus. *Hebei Medical Journal* 2016; 38(18): 2761-2764. doi: 10.3969/j.issn.1002-7386.2016.18.011.
5. Hua Y, Jiang C, Wu J, *et al.* Effects of high-dose Vitamin D injection combined with mendong insulin on insulin sensitivity and parathyroid hormone levels in pregnant women with gestational diabetes (in Chinese). *China Pharmaceuticals* 2014; 23(12): 38-40.
6. Wang H, Wu J. Effect of Huangqi sijnunzi decoction on the treatment of gestational diabetes and its effect on serum c-reactive protein, Mg²⁺ and adiponectin levels (in Chinese). *Modern Journal of Integrated Traditional Chinese and Western Medicine* 2015; 24(26): 2927-2929. doi: 10.3969/j.issn.1008-8849.2015.26.028.
7. Ren Z, Li G. Study on the effect of insulin aspart in treatment of patients with gestational diabetes and its influence on cardiac function in offspring. *Journal of Clinical and Experimental Medicine* 2015; 14(2): 122-125. doi: 10.3969/j.issn.1671-4695.2015.02.016.
8. *Chinese Journal of Diabetes* 2017; 25(4): 325-329.
9. Liu M, Qin Y, Xing J. Effect of insulin aspart combined with Huangqi sijnunzi decoction on gestational diabetes mellitus and its influence on pregnancy outcomes. *Chinese Journal of Woman and Child Health Research* 2017; 28(7): 874-876. doi: 10.3969/j.issn.1673-5293.2017.07.040.
10. Xie L, Zhao D, Li S. Effect of metformin combined with Huangqi sijnunzi decoction on pregnancy outcome of pregnant women with gestational diabetes (in Chinese). *Liaoning Journal of Traditional Chinese Medicine* 2016; 43(8): 1678-1680.
11. Cheng H, Mei B. Effects of individualized nutrition intervention combined with astragalus sijnunzi decoction on pregnancy outcomes of pregnant women with gestational diabetes (in Chinese). *Maternal & Child Health Care of China* 2016; 31(6): 1317-1319. doi: 10.7620/zgfybj.j.issn.1001-4411.2016.06.77.
12. Li Q, Gao Y, Zhang J. Analysis of the effect of insulin pump on gestational diabetes on pregnancy outcome (in Chinese). *Contemporary Medicine* 2019; 26(19): 120-122.
13. Zhang B, Chang M. Insulin resistance and islet function changes in pregnant women with gestational diabetes before and after delivery (in Chinese). *Clinical Medical Research and Practice* 2019; 4(19): 87-88.
14. Su F. Clinical study of astragalus granule combined with insulin pump double wave therapy in the treatment of pregnant women with gestational diabetes (in Chinese). *Journal of Practical Diabetology* 2019; 15(3): 49-50.
15. Zhou H, Xu Q, Cai P. Effect of high-dose vitamin D on prevention and treatment of gestational diabetes mellitus in obese pregnant women. *Chinese Journal of General Practice* 2017; 15(11): 1911-1914. doi: 10.16766/j.cnki.issn.1674-4152.2017.11.027.

16. Wang Y, Liu W, Wang J, *et al.* Clinical observation of mendong insulin combined with biosynthesis of human insulin in the treatment of gestational diabetes (in Chinese). *Medical Pharmaceutical Journal of Chinese Peoples Liberation Army* 2016; 28(1): 96-100. doi: 10.3969/j.issn.2095-140X.2016.01.024.
17. Pan B, Ma R. Correlation between serum adipokin-1 and chemerin levels and gestational diabetes (in Chinese). *Journal of Southern Medical University* 2016; 36(9): 1231-1236. doi: 10.3969/j.issn.1673-4254.2016.09.12.

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Contact Information

Address: 73 Upper Paya Lebar Road #07-02B-03 Centro Bianco, Singapore

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