

Positive Effect of Chaqin Wendan Decoction on Anxiety and Depression Model Rats

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Abstract. Objectives: To investigate the effect of Chaqin Wendan Decoction (CWD) and mechanisms for anxiety and depression-like behavior in rats. **Methods:** We divide SD male rats into four groups randomly (blank group, model group, diazepam group and Chinese medicine group). The anxiety and depression model rats were induced by chronic unpredictable emotional stress. Chinese medicine group and diazepam group were given CWD and diazepam respectively. The model group and the blank group were given the same amount of normal saline per day. The general state of the rats was recorded, and an open field trial and operation of the Morris water maze test were performed. The concentration of 5-HT was measured. **Results:** Compared with the model group, the body weight, horizontal movement distance score, number of upright, and target quadrant percentage of the rats in the Chinese medicine group increased significantly ($P < 0.05$), and the latency decreased significantly ($p < 0.05$). The concentration of 5-HT in the Chinese medicine group and diazepam group was significantly decreased by ELISA kit ($P < 0.05$). **Conclusion:** WD can significantly promote the learning and cognitive ability of rats with anxiety and depression. Its mechanism of action may be closely related to the ability of CWD to reduce 5-HT concentration.

1. Introduction

Anxiety and depression are the two most common neuropsychiatric diseases in today's society. They are highly related and often occur at the same time, causing a great financial burden for patients. [1] WHO epidemiological survey shows that the proportion of co-diseases can be as high as 70 %, and nearly 80 % of depression patients are accompanied by anxiety symptoms. Anxiety symptoms can not only cause resistance to depression treatment, but also increase their disability rate [2]

Currently, more and more modern medicines, tricyclic antidepressants, for example, have been used to treat anxiety and depression. However, these drugs have kinds of side effects and high price, which greatly delay patients' treatment [3].

CWD, a famous Chinese prescription, origins from *Three Causes—Diseases and Syndrome* (a traditional Chinese medicine masterpiece). Currently, it has been demonstrated with obvious effects on the treatment of anxiety and depression [4-5].

In this study, we used anxiety model rats introduced by unpredictable mild stress to research the effect of CWD on their behaviors and inhibitory neurotransmitter.



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2. Materials and Methods

2.1. Animals

The SD rats, body weight (180 ~ 200) g, are male and SPF grade. And all rats received standard feed and drink water.

2.2. Experimental Materials

2.2.1. Drugs and Reagents

Experimental reagent: 5-HT kit (Shanghai Fanke Biotechnology Co., Ltd., 96T); compound diazepam tablets (0.25mg/tablet, 10 tablets, Jining Ankang Pharmaceutical Co., Ltd., Chinese medicine quasi-word H10970219,); Bupleurum 12g; Scutellaria 10g; Qing Pinxia 12g; Fructus Aurantii Immaturus 12g; Bamboo shaving 10g; dried orange peel 6g; Poria cocos 20g; raw licorice 3g (Guangdong Tianjiang Fenjian granules).

2.2.2. Experimental Equipment

Open field box, constant temperature bath pot, and small centrifuge desktop.

2.3. Methods

2.3.1. Grouping and Administration

Twenty male rats were divided into 4 groups randomly: blank group, model group, Chinese medicine group ($11.5 \text{ g} \cdot \text{kg}^{-1}$) and diazepam group ($0.26 \text{ mg} \cdot \text{kg}^{-1}$). The blank group and the model group were respectively given the same volume of distilled water at 0.4 ml/kg/d . The other groups were given corresponding drugs at 2 ml/kg/d by irrigation stomach.

2.3.2. Model Preparation

The model rats were established by chronic unpredictable emotional stress. Except the blank group, other three groups were received nine kinds of unpredictable stress in 7 days. The rats received 2 or 3 kinds of random stress stimulation a day.

2.4. Observations

2.4.1. Body Weight

Record daily body weights of rats.

2.4.2. Open-field Test

The rats were placed in the bottom of the open box. Record the horizontal movement of the rats and the vertical movement of the rats. And the total score is used to evaluate the change of their exploratory behavior.

2.4.3. Morris Water Maze

The water maze device is divided into four quadrants of equal size. The central position of each quadrant wall above the water surface is marked with chalk drawing of 4 different eye-catching marks. A black circular platform below the water surface, and was placed in the center of the fourth quadrant with the same position.

2.4.4. Place Navigation Test

In each experiment, the time of discovering the hidden platform (escape latency) and distance was followed by the intelligent video tracking system. The training lasted for 5 days, once a day [6].

2.4.5. 5-HT

The concentration of 5-HT in rat hippocampus was strictly determined according to the ELISA kit

instructions.

2.5. Statistical Analyses

Numerical data were expressed as the mean \pm standard deviation (SD). Statistical analyses were performed using SPSS 17.0 for Windows (SPSS, China, IL, and U.S.A.). $P < 0.05$ was considered statistically significant.

3. Results

3.1. Effect of CWD on the General State of Anxiety Model Rats

Compared with the model group, the weight of the diazepam group and the Chinese medicine group increased significantly ($P < 0.05$) (Table1).

Table 1. Effect of Chaqin Wendan Decoction on the Weights of Anxiety Model Rats (unit:g, $n=3$, $\bar{x} \pm s$)

Group	weights
Blank group	256.00 \pm 10.82
Model group	183.00 \pm 4.00*
Diazepam group	208.33 \pm 11.24 [#]
Chinese medicine group	212.33 \pm 2.52 [#]

Note: Compared with the blank groups, * $P < 0.05$; Compared with the model groups, [#] $P < 0.05$.

3.2. Effect of CWD on Open-field Test Level Score of Anxiety Model Rats

Compared with the model group, the horizontal movement distance score of the diazepam group and Chinese medicine group was significantly increased ($P < 0.05$) (Table2).

Table 2. Effect of CWD on Open-field Test Level Score of Anxiety Model Rats (unit: score, $n=3$, $\bar{x} \pm s$)

Group	Level the score
Blank group	44.33 \pm 10.02
Model group	13.00 \pm 4.58*
Diazepam group	29.67 \pm 8.50 [#]
Chinese medicine group	33.67 \pm 7.77 [#]

Note: Compared with the blank groups, * $P < 0.05$; Compared with the model groups, [#] $P < 0.05$.

3.3. Effect of CWD on Open-field Test Upright Times of Anxiety Model Rats

Compared with the model group, the upright times of the diazepam group and the Chinese medicine group were obviously increased ($P < 0.05$) (Table 3).

Table 3. Effect of CWD on Open-field Test Upright Times of Anxiety Model Rats (unit: score, n=3, $\bar{x} \pm s$)

Group	Upright times
Blank group	11.67±1.15
Model group	4.33±1.53*
Diazepam group	8.67±2.52 [#]
Chinese medicine group	11.00±1.00 [#]

Note: Compared with the blank groups, * $P < 0.05$; Compared with the model groups, [#] $P < 0.05$.

3.4. Effect of CWD on Water Maze Incubation Period in Anxiety Model Rats

Compared with the model group, the latency of the diazepam group and the traditional Chinese medicine group was significantly decreased ($p < 0.05$) (Table 4).

Table 4. Effect of CWD on Water Maze Incubation Period in Anxiety Model Rats (unit: s, n = 3, $\bar{x} \pm s$)

Group	Latency
Blank group	11.00±1.00
Model group	36.33±4.04*
Diazepam group	8.33 ±2.08 [#]
Chinese medicine group	8.00 ±1.00 [#]

Note: Compared with the blank groups, * $P < 0.05$; Compared with the model groups, [#] $P < 0.05$.

3.5. The Effect of CWD on the Percentage of the Water Maze Target Quadrant in the Model of Anxiety Model

Compared with the model group, the percentage of target quadrant in the diazepam group and the traditional Chinese medicine group was significantly increased ($p < 0.05$) (Table5).

Table 5. Effect of CWD on the Percentage of Water Maze Target Quadrant in Anxiety Model Rats (unit: %, n= 3, $\bar{x} \pm s$)

Group	percentage of target quadrant
Blank group	28.20±2.27
Model group	6.94 ±1.45*
Diazepam group	23.18±0.94 [#]
Chinese medicine group	24.76±1.05 [#]

Note: Compared with the blank groups, * $P < 0.05$; Compared with the model groups, [#] $P < 0.05$.

3.6. Effect of CWD on the Concentration of 5-HT in Hippocampus of Anxiety Model Rats

Compared with the model group, the concentration of 5-HT in hippocampus of the diazepam group and the Chinese medicine group decreased significantly ($P < 0.05$) (Table 6).

Table 6. Effect of CWD on the Concentration of 5-HT in Hippocampus of Anxiety Model Rats (unit: ng/ml, n=3, $\bar{x} \pm s$)

Group	5-HT
Blank group	102.34 \pm 4.30
Model group	128.78 \pm 0.61*
Diazepam group	106.50 \pm 4.23 [#]
Chinese medicine group	106.52 \pm 0.94 [#]

Note: Compared with the blank groups, *P<0.05; Compared with the model groups, [#]P <0.05.

4. Discussion

In our experiments, body weight in the model group rats was significantly reduced, the reason is anxiety and depression can suppress appetite, which is consistent with clinical observations.[7] Compared with the model group, body weight in the Chinese medicine group rats was obviously increased. We conclude that CWD does opposite anxiety and depression-like behavior in rats.

In the open field experiment, the horizontal distance score and the number of upright times in the anxiety and depression model rats should be decreased. [8] In our experiments, the scores of the Chinese medicine group and the diazepam group were significantly higher than those of the model group. Therefore, we can conclude that CWD has a positive effect on anxiety and depression.

In the Morris water maze test, compared with the model group, latency of the Chinese medicine group and the diazepam group was significantly reduced, and the target quadrant percentage was significantly increased. We know that the longer the incubation period, the lower the target quadrant percentage, the higher the anxiety level, and the worse the corresponding learning and memory skills. [9-10]. This indicates the improvement of CWD on the learning and memory ability of anxious rats.

A large number of facts have proven to reduce the anti-anxiety effect of 5-HT drugs. In our experiments, it was clear that the 5-HT concentration in the diazepam and Chinese medicine groups was significantly lower than in the model group, indicating that diazepam and CWD can achieve anxiolytic and depression by reducing the concentration of 5-HT. effect.

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