International Journal of Clinical and Experimental Medicine Research, 2024, 8(2), 263-266
https: //www.hillpublisher.com/journals/ijcemr/
ISSN Online: 2575-7970
ISSN Print: 2575-7989

Clinical Effect Analysis of Metadoxine in the Treatment of Acute Severe Alcoholism

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How to cite this paper: Huilu Li. (2024) Clinical Effect Analysis of Metadoxine in the Treatment of Acute Severe Alcoholism. *International Journal of Clinical and Experimental Medicine Research*, 8(2), 263-266.
DOI: 10.26855/ijcemr.2024.04.013

Received: March 29, 2024
Accepted: April 27, 2024
Published: May 23, 2024

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Abstract

Objective: To observe the clinical effect of metadoxine in the treatment of acute severe alcoholism. **Methods:** A total of 86 patients with acute severe alcoholism admitted to our hospital from January 2022 to January 2023 were randomly selected for study, and divided into an observation group (treated with naloxone hydrochloride + metadoxine) and a control group (treated with naloxone hydrochloride) according to random number table method, and the clinical effects of the two groups were compared. **Results:** At admission, there was no significant difference in blood alcohol concentration between the two groups ($P>0.05$). In the follow-up tests 1h, 2h, and 4h after admission, the blood ethanol concentration of the observation group was significantly lower than that of the control group, with no statistical significance ($P<0.05$). The waking time, discharge time, and incidence of adverse reactions in the observation group were significantly lower than those in the control group, with no statistical significance ($P<0.05$). **Conclusion:** The treatment of metadoxine in patients with acute severe alcoholism can significantly improve the concentration of alcohol in the body and reduce the discharge time of patients, which has clinical popularization value.

Keywords

Metadoxine, Acute severe alcoholism, Naloxone hydrochloride

Introduction

Metadoxine is a drug that speeds up the clearance of alcohol from the body and is commonly used to treat acute alcoholism. When dealing with acute alcoholism, traditional practices often include supportive care, such as keeping the patient's ventilation and circulatory system stable, and monitoring and correcting problems such as possible electrolyte imbalances, hypothermia, and hypoglycemia. In recent years, metadoxine has been used clinically as an adjunct drug, which has antioxidant effects and promotes the activity of alcohol dehydrogenase, helping to speed up the metabolic process of acetaldehyde, the main metabolite of alcohol in the human body and the root cause of many alcohol-related discomforts [1]. By speeding up the metabolism of alcohol and acetaldehyde, metadoxine helps shorten the half-life of alcohol, thereby rapidly reducing blood alcohol concentration and improving symptoms [2]. To this end, 86 patients with acute severe alcoholism were selected for this study, aiming to observe the clinical effect of metadoxine in the treatment of acute severe alcoholism. The following is reported.

1. Data and methods

1.1 General Information

A total of 86 patients with acute severe alcoholism admitted to our hospital from January 2022 to January 2023 were

randomly selected for the study, and were randomly divided into an observation group and a control group, with 43 cases in each group. In the observation group, a total of 32 male patients and 11 female patients were included, whose ages ranged from 18 to 59 years old, the mean age was 36.58 years old, and the standard deviation was ±6.11 years old. A total of 31 males and 12 females were included in the control group. Their ages ranged from 19 to 59 years old, the mean age was 37.33 years old, and the standard deviation was ±5.92 years old. There was no significant difference in the general data between the two groups of patients ($P > 0.05$), which was comparable, and this study met the review standards of the Medical Ethics Committee, so it was conducted.

Inclusion criteria: (1) Diagnosis of acute severe alcoholism. (2) The informed consent has been signed. (3) Follow-up evaluation can be performed [3].

Exclusion criteria: (1) Pregnant or lactating women. Individuals who are allergic to metadoxine or any component of the investigational drug. Known to have serious liver, kidney, or heart disease. (2) Drugs that may interact with metadoxine are being used. Have mental health problems, such as serious mental illness or mental disorders.

1.2 Methods

Control subjects received an intravenous infusion of 1mg naloxone hydrochloride, which was provided by Chongqing Lemei Pharmaceutical Co., LTD. (Approval number: H20073029, lot number: 131021) and dissolved in 20 ml normal saline. Following this, 2mg of naloxone was mixed in 250 ml of normal saline by intravenous drip at a rate of 0.4mg per hour.

The observation group received naloxone hydrochloride combined with metadoxine treatment. Metadoxine is supplied by Zhejiang Zhenyuan Pharmaceutical Co., LTD. (Approval number is H20130022, batch number: 131104). Naloxone was administered in the same pathway and dose as the control group, whereas metadoxine was administered at a dose of 0.9g with 500 ml of normal saline for a single intravenous infusion.

Both groups received the same basic treatment measures, including ensuring airway obstruction, ECG monitoring according to patients' specific conditions, establishing intravenous infusion channels, liquid supplementation, and giving appropriate doses of vitamin B1, B6, C, and gastric mucosal protective agents.

1.3 Observation Indicators

The alcohol concentration, waking time, discharge time, and incidence of adverse reactions were compared between the two groups in different time periods.

1.4 Statistical Analysis

Data processing is based on SPSS21.0 for data statistics and processing. Measurement data were represented by [n (%)], x^2 test was adopted, and measurement data ($\bar{x} \pm s$) was used as measurement data. $P < 0.05$ indicated that there was a significant difference between the two groups.

2. Results

2.1 Comparison of ethanol concentration between the two groups in different time periods

At admission, there was no significant difference in blood alcohol concentration between the two groups ($P>0.05$). In the follow-up tests 1h, 2h, and 4h after admission, the blood ethanol concentration of patients in the observation group was significantly lower than that of the control group, with no statistical significance ($P<0.05$), as shown in Table 1.

Table 1. Comparison of ethanol concentration between the two groups in different time periods

group	At admission	1h after admission	2h after admission	4h after admission
Observation group	220.41±62.48	152.58±46.53	105.43±44.45	84.52±31.56
Control group	218.36±59.51	192.31±50.34	138.56±42.41	103.68±45.47
t	0.156	3.801	3.536	2.270
P	0.438	0.000	0.000	0.013

2.2 Comparison of waking time and leaving hospital time

The waking time and discharge time of the observation group were lower than those of the control group ($P < 0.05$). As shown in Table 2:

Table 2. Comparison of waking time and discharge time between the two groups

group	Waking time	Discharge time
Observation group	4.13±1.25	26.43±8.49
Control group	2.92±0.86	31.41±7.76
t	5.230	2.839
P	0.000	0.003

2.3 Comparison of the incidence of adverse reactions between the two groups

In the observation group, 1 case of skin allergy occurred, and the incidence of adverse reactions was 2.33%. No adverse reactions occurred in the control group. There was no significant difference between the two groups ($X^2=1.012$, $P=0.314$).

3. Discussion

Alcoholism is a common and potentially fatal clinical emergency that occurs when people consume more alcohol than their liver can metabolize. Acute alcoholism can cause a range of vital sign disorders, such as coma, respiratory depression, hypothermia and hypoglycemia, and can lead to serious health problems or death [5]. Therefore, it is of great significance to improve the treatment efficiency of acute severe alcoholism and reduce the incidence of complications and mortality.

In the traditional treatment of acute alcoholism, drugs such as naloxone hydrochloride are often used to correct alcohol-induced low respiratory depression, and metadoxine has attracted much attention as an adadjuvant due to its properties of increasing the metabolic rate of alcohol and its main metabolite, acetaldehyde. The purpose of this study is to verify the clinical effect of metadoxine combined with naloxone hydrochloride in the treatment of acute severe alcoholism, and to find a more effective way to detoxify.

Acute alcoholism is a common clinical problem in the emergency department, which usually results from excessive intake of alcohol, triggering a toxic reaction centered on neuropsychiatric abnormalities. The clinical pathway can be divided into the following stages: an initial period of agitation caused by excitation of the central nervous system, and then as symptoms worsen, the patient exhibits neurological dysfunction, manifested by loss of motor coordination, and may eventually progress to a coma state. The literature indicates that once the blood alcohol level rises above 2,500 mg/L, the patient may enter a coma [6]. The main signs at this time include dilated pupils, decreased blood pressure and slowed breathing. Without timely intervention, patients with extreme poisoning may die from respiratory failure. Ethanol needs to be metabolized by the liver, and once its concentration exceeds the metabolic threshold of the liver, it begins to accumulate in the body and the concentration continues to rise. At high concentrations, ethanol can penetrate the blood-brain barrier and interfere with brain function. Specifically, the hypothalamus releases neuromodulators that prompt the pituitary gland to produce excessive amounts of endogenous opioids. Ethanol also affects the nervous system through its metabolite, acetaldehyde, which binds to dopamine and acts directly or indirectly on opioid receptors in the brain, triggering a series of pathological changes. These changes initially manifest as central nervous system excitation, followed by central depression, which can eventually lead to respiratory failure and the patient's death. In view of the above pathological mechanisms, the treatment of acute alcoholism needs to be rapid and effective, firstly to reduce the further absorption of alcohol, secondly to strengthen supportive treatment to ensure the stability of patients' vital signs, and to take measures to accelerate the metabolism and excretion of alcohol. In cases of severe poisoning, it may be necessary to use mechanical ventilation to support breathing and prevent death from respiratory failure.

Naloxone is an opioid receptor antagonist that relives central nervous system inhibition and improves respiratory function, promoting the return of chronic breathing to a normal frequency. Administered intravenously, naloxone rapidly binds to opioid receptors, blocking their activity and thereby reducing the inhibitory effect of ethanol on the central nervous system [7]. This mechanism can significantly improve respiratory and circulatory function, help

patients regain consciousness quickly, and can effectively reduce the risk of death caused by such conditions. On the other hand, metadoxine plays a catalytic role in the process of ethanol metabolism by reducing the concentration of ethanol in the blood and speeding up its metabolic rate, thereby shortening the retention time of ethanol in the body. Metadoxine has antagonistic effect on the decreased activity of acetaldehyde dehydrogenase, and can enhance the activity of this enzyme and accelerate the elimination process of ethanol and its metabolite acetaldehyde. In this way, metadoxine helps relieve the symptoms of alcohol poisoning and speeds up the clearance of ethanol from the body.

The results of this study showed that the combination of metadoxine and naloxone hydrochloride was significantly superior to the treatment of naloxone hydrochloride alone. The statistical data showed that the blood ethanol concentration of patients in the observation group was significantly lower than that of the control group at 1 hour, 2 hours, and 4 hours after treatment, demonstrating the effectiveness of metadoxine in reducing blood ethanol concentration. In addition, the waking time and discharge time of the observation group were significantly shorter than that of the control group, indicating that metadoxine can significantly accelerate the recovery rate of patients with alcoholism. Metadoxine has clinical potential, especially in the treatment of acute severe alcoholism. The drug can improve the metabolism of alcohol in the body of patients, which is of great significance for reducing the inhibition of the central nervous system and promoting the early recovery of consciousness in patients. However, as with any clinical application, sufficient attention should be paid to the possible adverse effects of metadoxine. Although only one cutaneous allergic reaction occurred in the observation group and not in the control group, this is not sufficient to demonstrate the safety of metadoxine when used in a broad population.

Given that the sample size of this study is insufficient, may be biased, and safety and efficacy in different populations (such as patients with liver insufficiency or other underlying conditions) have not been discussed in depth, large-scale, multicenter clinical studies are needed to further evaluate the safety and efficacy of metadoxine before it can be extended to clinical practice. At the same time, future studies should also consider the long-term observation of adverse reactions and the possibility of drug interactions.

In summary, this study provides preliminary evidence of the clinical efficacy of metadoxine combined with naloxone hydrochloride in the treatment of acute severe alcoholism, providing an important basis for further research and the use of this drug in the treatment of acute alcoholism. However, more research is needed to investigate and validate the optimization of the therapy, the probability of side effects of metadoxine, and its generality in different patient populations.

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