

Zanthoxylum bungeanum Oil poisoned to death:A case report

Yuxin Yang*,Qionglan Dong,Mei Yang,Qibing Tang

KEYWORDS: Zanthoxylum bungeanum Oil,Poisoning,Treatment

ABSTRACT

Background: Zanthoxylum bungeanum Oil is widely used in the world,it has great edible value and medicinal value,but Zanthoxylum bungeanum oil is also toxic.overdose of Zanthoxylum bungeanum oil can lead to human body poisoning and even death.

Case summary:We reported a case of oral overdose of Chinese pepper essential oil poisoning.Although he was actively treated, he still died within a few hours.

Conclusion:This case indicates overdose of Zanthoxylum bungeanum oil can lead to human body poisoning and even death.At present, the poisoning mechanism and effective treatment are not clear.

INFORMED CONSENT STATEMENT:Written informed consent was obtained from the patient's family for publication of this case report.

INTRODUCTION

Zanthoxylum bungeanum Oil is widely used in the world,it has great edible value and medicinal value[1],but Zanthoxylum bungeanum oil is also toxic.We reported a patient who died within a few hours after taking too much Zanthoxylum bungeanum oil.At present,there is no effective treatment.We hope that there will be more toxicological and treatment studies on Zanthoxylum bungeanum oil poisoning in the future,so as to save the lives of similar patients as much as possible.

1. CASE PRESENTATION

1.1 CLINICAL DATA

A 53-year-old male was admitted to hospital in a coma for 2 hours after taking Zanthoxylum bungeanum oil 200ml.The patient had paroxysmal limb convulsions and gaze for several minutes each time,accompanied by a large number of oral secretions and gatism.When entering the emergency department,vital signs: T36.5 °C,HR127 beats/min,R25 breaths/min,BP201/138mmHg,SPO₂94%,GCS score: E1V2M3; neck and face skin

From the *Department of Critical Care Medicine,The Third Hospital of Mianyang

Correspondence to: Yuxin Yang,No.190,East Section of Jiannan Road,Mianyang City,Sichuan Province,China;

Email: 87172788@qq.com.

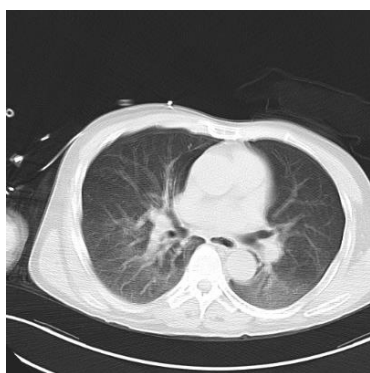
redness,bilateral pupil dilated equal circle,diameter about 5mm,disappearance of light reflex,shortness of breath,lung smell and scattered wet rales,airway can suck out bloody secretions,arrhythmia,limb muscle tone slightly high,limbs can be seen spots.Emergency treatment: establishment of venous passage,tracheal intubation,invasive ventilator-assisted breathing,gastric lavage with clean water 5000ml,gastric drainage of a large amount of pepper oil-flavored gastric juice,intravenous drip of 500ml Ringer's solution,intravenous push of furosemide 20mg and so on.

1.2 Laboratory examination

Blood gas analysis: PH 6.93,PO₂ 76mmHg,dPCO₂ 62.5mmHg,HCO₃⁻ 12.6mmol/L,Lac 11.4mmol/L; Serum troponin I (Trop I): 4.93ng/ml,B-type natriuretic peptide precursor (pro-BNP): 132pg/ml; Blood routine: WBC: 20.42*10⁹/L; neutrophil count: 20.42*10⁹/L; Lymphocyte count: 3.49*10⁹/L; Hemoglobin: 157g/L; hematocrit: 47.9%; platelet count: 179*10⁹/L; coagulation function: prothrombin time (PT) 12.6sec,international standard ratio (INR) 1.08,partial thromboplastin time (29.2sec),thrombin time (TT) 24.4 sec,D-Dimer 3.71mg/L,fibrinogen degradation product (FDP) 6.2mg/L.Alanine aminotransferase (ALT): 90U/L; Aspartate aminotransferase (AST): 207U/L,Procalcitonin: 0.791ng/ml; Myoglobin (MYO): 465.71ng/ml; UREA: 10.14mmol; Creatinine:130umol/L.Glucose: 12.85mmol/L.

1.3 Imaging examination

Chest CT:The texture of both lungs increased,the flocculent density of both lungs increased,and the edge was blurred(Picture 1).



(Picture 1,Chest CT)

2.Rescue process and treatment

When the patient was transferred to the intensive care unit,the patient had acute pulmonary edema,toxic encephalopathy,toxic myocarditis,toxic liver injury,acute kidney

injury,metabolic acidosis combined with respiratory acidosis,etc.In the treatment,fluids were given,and sodium bicarbonate was continuously instilled to correct acidosis.The patient developed arrhythmia,and the electrocardiogram showed non-paroxysmal ventricular tachycardia.Afterwards,the patient's blood pressure dropped to 75/55mmHg,and norepinephrine was given to pump up the pressure , Ringer's solution 500ml/h rehydration,Bedside ultrasound showed that the whole heart contractility decreased,and adrenaline was given intravenous pumping to strengthen the heart.Soon,the patient gradually experienced a drop in heart rate,he was given active cardiopulmonary resuscitation,and repeated intravenous boluses of adrenaline to strengthen the heart.After active rescue,the patient was invalid and declared clinical death.

3.Discussion

Zanthoxylum bungeanum is the peel of *Zanthoxylum* L.,a plant belonging to the Rutaceae family.There are about 250 species in the world,distributed in tropical and subtropical regions of Asia,America,Africa and Oceania.*Zanthoxylum bungeanum* contains a lot of essential oils,which are the source and secondary metabolites of *Zanthoxylum bungeanum*.It is also the main source of the aroma of *Zanthoxylum bungeanum*[1].The chemical components of *Zanthoxylum bungeanum* oil are mainly composed of four categories: terpenes,aromatic compounds,aliphatic compounds,and nitrogen-containing and sulfur-containing compounds[2].*Zanthoxylum bungeanum* oil has a variety of pharmacological effects.Studies have found that *Zanthoxylum bungeanum* oil can inhibit the proliferation of H22 liver cancer cells and stimulate cell apoptosis,but it cannot exert anti-tumor effects by improving the body's immune function[3].*Zanthoxylum bungeanum* oil has a local anesthetic effect similar to that of procaine.The time required for 20% *Zanthoxylum bungeanum* oil to block the impulse conduction of the nerve trunk is close to that of 5% procaine.The anesthetic effect of *Zanthoxylum bungeanum* may be related to the relaxing effect of water-soluble alkaloids on striated muscle[4].*Zanthoxylum bungeanum* oil also has a certain effect on the cardiovascular system.Studies have found that *Zanthoxylum bungeanum* oil has an anti-atherosclerotic effect,which is related to its reduction of serum lipid peroxide levels and resistance to lipid peroxidation damage[5].In addition,*Zanthoxylum*

bungeanum extract has a significant inhibitory effect on digestive tract ulcers[6].

Zanthoxylum bungeanum oil has a wide range of pharmacological effects, but it is acutely toxic to animals. Yuan used 4 routes of administration, intraperitoneal, intramuscular, and subcutaneous administration, and found that the lethal doses of Zanthoxylum bungeanum oil to mice were 2.27, 2.03, 4.64, and 5.32 g/kg, respectively[7]. Mice given a lethal dose showed symptoms such as slowness of movement, lethargy, diarrhea, slowed heart rhythm and breathing, and convulsions of limbs. The study also found that oral and intraperitoneal injections are relatively more toxic. The patient in this case report quickly developed limb twitching, binocular gaze, incontinence, and disturbance of consciousness after taking Zanthoxylum bungeanum oil. After being admitted to the hospital, the patient quickly developed respiratory and circulatory failure, arrhythmia, severe metabolic acidosis, etc., and the active rescue failed. It took only 5 hours for the patient to die after taking Zanthoxylum bungeanum oil, indicating that large doses of Zanthoxylum bungeanum oil are highly toxic and can quickly cause death.

At present, there are no reports on the treatment of Zanthoxylum bungeanum oil poisoning and its poisoning toxicology studies, and the toxic and lethal doses of Zanthoxylum bungeanum oil to humans are not clear, and due to the different extraction methods of Zanthoxylum bungeanum oil, the ingredients contained are also different. For people with pepper essential oil poisoning, only symptomatic treatment can be given to induce vomiting and gastric lavage as soon as possible to reduce the absorption of toxins. I hope that there will be more studies on the toxicology and treatment methods of Zanthoxylum bungeanum oil in the future, so as to save the lives of similar patients as much as possible.

4.CONCLUSION

Zanthoxylum bungeanum oil poisoning can lead to coma, limb twitching, arrhythmia, and acute pulmonary edema. In severe cases, multiple organ dysfunction and even death can occur quickly. However, there is no specific treatment for poisoning by this oil. There will be more studies on the toxicology and treatment methods of Zanthoxylum bungeanum oil in the future.

FINANCIAL SUPPORT

This case report was funded by the Sichuan Medical Association (NO.s2007).

Competing interests: None declared.

Author contributions

Yuxin Yang and Qionglan Dong conceived the study, participated in its design and draft the manuscript; Mei Yang and Qibing Tang collected data; Yuxin Yang helped to draft the manuscript; all authors read and approved the final manuscript.

REFERENCES

- [1]Di Ke,Shi Xueping,Zhang Weiming,Progress in the Study of *Zanthoxylum bungeanum* Oil[J].Chirtese Wild Plant Resources,2011,30(004):7-12.DOI:10.3969/j.issn.1006-9690.2011.04.002
- [2] Tiwary M,Naik SN,Tewary DK,et al.Chemical composition and larvicidal activities of the essential oil of *Zanthoxylum armatum* DC (Rutaceae) against three mosquito vectors[J].J Vector Borne Dis,2007,44(3):198-204.
- [3]YUAN Tai-ning,WANG Yan-lin,WANG Jun-zhi,Primary Study of the Anti-tumor Effect and its Mechanism of *Zanthoxylum* in vivo and in vitro[J].Lishizhen Medicine And Materia Medica Research,2008, 19(12): 2915-2916.DOI:10.3969/j.issn.1008-0805.2008.12.041
- [4] Zhu Dan,Zheng Tong,Chen Yu,Yang Guangzhong,Studies on the chemical constituents of *Zanthoxylum utile* Huang[J].Journl of Huazhong normal university,2009,43(3):424-427.DOI:10.19603/j.cnki.1000-1190.2009.03.018.
- [5]Hui Liang,Lei Zhao,Jing Yang,Huajiao huaxue chengfen ji yaoli zuoyong de yanjiu jinzhan[J].Huaxi yaoxue zazhi.2014,29(1):91-94.DOI:10.13375/j.cnki.wcjps.2014.01.033
- [6]Mingfa Zhang,Yaqin Shen,Huajiao wenjing zhitong he wenzhong zhixie yaoli yanjiu[J].Zhong Yaocai,1994, 17(2):37-40.DOI:10.13863/j.issn1001-4454.1994.02.021
- [7]Lljuan Yuan,Zhongmin He,Siwang Wang,et al.Acute Toxicity of Volatile Oil from *Zanthoxylum bungeanum* Maxim[J].Lishizhen Medicine And Materia Medica Research,2010, 21(10):2696-2697.DOI:10.3969/j.issn.1008-0805.2010.10.128.