The causes of adverse reactions in traditional Chinese medicine

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With the increasingly widespread application of traditional Chinese medicine in clinical practice, the safety of traditional Chinese medicine has been given more attention. The occurrence of adverse drug reactions of traditional Chinese medicine will harm the health of patients, leading to a certain incidence rate and mortality rate, and serious adverse drug reactions of traditional Chinese medicine will lead to increased treatment costs of patients, bringing huge economic burden to patients and society [1–3]. Therefore, it is necessary to explore the causes of adverse reactions of traditional Chinese medicine and strengthen targeted monitoring, evaluation of risks and efficacy of adverse reactions of traditional Chinese medicine to ensure medication safety.

The occurrence of adverse reactions in traditional Chinese medicine is mainly influenced by three factors. Firstly, it is influenced by inherent factors of traditional Chinese medicine, which are related to drug sources, compatibility, dosage, processing, and pharmaceutical preparations; Secondly, traditional Chinese medicine is influenced by diagnostic and medication accuracy, timing and duration of medication, medication environment, administration methods, and interactions with other drugs during clinical use; The third reason is due to individual differences in the patient's condition, which are related to factors such as constitutional variances, gender and age, special groups, allergic reactions, genetics, etc (Figure 1).

The inherent toxicity of traditional Chinese medicine is an important cause of adverse reactions [4]. The main factors affecting the toxicity of traditional Chinese medicine include: (1) Source. Traditional Chinese medicine is used with multiple varieties and medicinal parts, and the toxicity of different varieties of drugs is different. The toxicity of different medicinal parts of traditional Chinese medicine is different, and it is often caused by the failure to use specified varieties, the failure to use specified medicinal parts, and the misuse of true or false varieties, which can lead to adverse reactions of traditional Chinese medicine. (2) Compatibility. When using traditional Chinese medicine, drug compatibility often follows certain principles, and drug selection and addition should be based on the condition, characteristics, and severity of the disease. Choosing drugs that match each other can increase drug efficacy, while drugs that fear each other can reduce or eliminate toxic reactions. But if the compatibility is improper, it can easily cause many adverse reactions [5]. (3) Dosage. Most traditional Chinese medicine has toxic side effects on the human body. If taken in large doses for a long time, or due to the low metabolic rate of some patients, the drugs accumulate in the body, causing adverse reactions [6]. (4) Processing. Most traditional Chinese medicine can enhance therapeutic effects, reduce toxicity, and reduce toxic side effects after processing. However, when using certain drugs, improper or unprocessed processing methods can increase the risk of adverse reactions. (5) Pharmaceutical preparations. With the continuous development and progress of pharmaceutical technology, the types of traditional Chinese medicine preparations are constantly increasing, and the composition of drug preparations is complex, especially injection compound preparations. Due to their high content of biological macromolecules such as proteins, polysaccharides, or tannins, polymerization reactions are prone to occur, which are the main allergens and cause allergic reactions in patients [7]. The occurrence of adverse reactions in traditional Chinese medicine injections is often related to factors such as excessive irrational use of drugs, blind mixing of traditional Chinese medicine and Western medicine, use of counterfeit and inferior drugs, non-standard intravenous infusion procedures, and use of toxic excipients [8]. Therefore, in the production process of traditional Chinese medicine, it is necessary to strengthen the supervision of the source, processing, and formulation of each traditional Chinese medicine, standardize the use and compatibility of traditional Chinese medicine, and especially strengthen the management of toxic traditional Chinese medicine [9].

![Figure 1 The causes of adverse reactions in traditional Chinese medicine](image-url)
Furthermore, in the process of clinical medication, diagnosis and medication can affect the efficacy of traditional Chinese medicine, leading to the occurrence of adverse drug reactions. (1) Accurate Diagnosis and Medication Precision: Incorrect diagnosis and medication decisions can lead to medication mismatch and trigger traditional Chinese medicine toxicity events. In clinical practice, doctors fail to accurately grasp the patient's syndrome type, provide incorrect diagnosis and traditional Chinese medicine prescriptions, or take medication on their own due to the patient's lack of medical knowledge, resulting in adverse reactions [10]. (2) Timing and Duration of Medication. The timing of medication and the duration of treatment may affect the patient's tolerance. (3) Medication environment. Environmental factors such as the location and climate of medication can affect the patient's medication response. (4) Administration Methods. Different medication methods such as oral, topical, and injection may also have an impact on the patient's response. (5) Drug Interactions. When taking traditional Chinese medicine and other drugs simultaneously, the interaction in the body may lead to adverse reactions.

In addition to the clinical application of traditional Chinese medicine, the occurrence of adverse reactions to traditional Chinese medicine is also related to the individual situation of patients. (1) Constitutional Variances. Identification of traditional Chinese medicine constitution is a prerequisite and basis for clinical diagnosis and treatment, as well as legislative medication. People with different constitutions have different tolerance to drug toxicity and prognosis after toxicity damage. Therefore, the occurrence of adverse reactions to traditional Chinese medicine is closely related to the patient's physical condition. (2) Gender and Age. Factors such as gender and age can affect drug reactions. (3) Special Groups. Special groups such as women, newborns, and the elderly have slightly weaker drug tolerance and are prone to adverse reactions. (4) Allergic Reactions. People who are allergic or highly sensitive to certain types of traditional Chinese medicine are more likely to experience adverse reactions. (5) Genetic Factors. The occurrence of adverse reactions to traditional Chinese medicine is also related to genetic factors.

The causes of adverse drug reactions are diverse, and adverse events often occur. Therefore, during the medication period, patients should be monitored for medication use. Based on the patient's illness, they should be informed of the medication method, potential adverse reactions, and precautions. Regular follow-up, medication history construction, observation indicators, and other follow-up measures should be taken [11]. At the same time, clinical staff of traditional Chinese medicine should continuously strengthen their learning, ensure the correct compatibility and dosage of prescriptions, and actively participate in scientific research to provide clinical data and solutions for related research on adverse reactions of traditional Chinese medicine. Medical institutions should also pay attention to the issue of safe drug use, strengthen the supervision and management of traditional Chinese medicine in various aspects such as production, circulation, use, and research and development, promote the rational use and standardized management of traditional Chinese medicine, reduce the occurrence of adverse events of traditional Chinese medicine, and promote the safety of traditional Chinese medicine use.

References


Author contributions
The manuscript was conceptualized by Feng KD. Funding acquisition was led by Li Xi. Zeng Yi conducted the investigation, Feng KD managed the project administration, and Yang Xi contributed resources. The original draft was written by Feng KD and Zeng Yi, while Li Xi undertook the writing, review, and editing process.

Competing interests
The authors declare no conflicts of interest.

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