

Analysis on Medication Rules of Four Classic Chinese Herbal Medicines in Dizziness Treatment Based on Data Mining

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Abstract: Based on the Traditional Chinese Medicine Inheritance Assistance Platform (V2.5), this study explores the medication patterns of famous traditional Chinese medicine practitioners using four classic herbal medicines to treat dizziness, providing medication reference for clinical treatment of dizziness. Collect prescriptions from CNKI for the treatment of dizziness using four classic herbs from Chinese traditional Chinese medicine practitioners, including 47 prescriptions for rhubarb, 74 prescriptions for Aconite root, 46 prescriptions for ginseng, and 122 prescriptions for prepared Radix Rehmanniae, and input them into the traditional Chinese medicine inheritance assistance platform to analyze their medication patterns. The total frequency of using tonifying qi and blood medicine is the highest. The four qi are mainly composed of cold, warm, and calm. The five flavors are sweet, bitter, and spicy. It mainly belongs to the liver, spleen, and kidney meridians, and is connected to the five organs. The most commonly used drug combination in prescriptions containing rhubarb is rhubarb and *Gastrodia elata*. The most commonly used drug combination for prescriptions containing Aconite root is Aconite root and *Atractylodes macrocephala*. The most commonly used drug combination for prescriptions containing ginseng is ginseng and *Astragalus membranaceus*; The most commonly used drug combination in prescriptions containing Radix Rehmanniae is Radix Rehmanniae and *Cornus officinalis*. Proficient in the medication methods of the four classic herbs, the treatment of dizziness has a significant therapeutic effect, reflecting that in deficiency syndrome, the main focus is on tonifying qi and blood, while in empirical syndrome, the basic treatment principles of wind, fire, phlegm, and blood stasis need to be distinguished. Famous traditional Chinese medicine practitioners have rich experience and are worth learning from.

Keywords: Dizziness; Data mining; Four Classic Herbs; Rules of medication

1. Introduction

The etiology of vertigo is complex, its incidence is increasing ^[1], and it is prone to misdiagnosis and underdiagnosis ^[2]. Western medicine is mostly based on symptomatic treatment such as dehydration, sedation and vasodilation. In contrast, TCM adopts an evidence-based approach to treat the symptoms and the root cause of the disease, and is more adaptable and individualized for complex diseases ^[3], with significant clinical effects ^[4,5]. Famous veteran TCM practitioners are the "great masters" of TCM and have a wealth of clinical experience in identifying and treating vertigo, and have their own unique academic ideas and theoretical systems ^[6,7], so it is important to inherit and learn from their treatment and medication experience.

Four classic herbs, namely rhubarb, Aconite root, ginseng, and Radix rehmanniae. These four medicines hold a pivotal position in the treatment of diseases, with outstanding abilities and can fulfill the great responsibility of treating diseases. The Complete Book of Jingyue states "Illness can be terrifying, and the situation cannot be aided by mediocrity. It cannot be achieved by these four things." Ginseng and Radix rehmanniae are good officials in governing the world; Aconite root and rhubarb are good generals in turbulent times. The combination of four classic herbal medicines to treat dizziness, including rhubarb for clearing the internal organs and relieving heat, Aconite root for warming and tonifying kidney yang, ginseng for tonifying vital energy, and Radix rehmanniae for nourishing kidney yin, reflects the basic treatment principles of dizziness and has significant therapeutic effects. Four

classic herbs are commonly used and difficult to use. Famous traditional Chinese medicine practitioners have accumulated rich experience in this field after years of exploration and accumulation. Apply the "Traditional Chinese Medicine Inheritance Assistance Platform" to statistically analyze the prescriptions of famous traditional Chinese medicine practitioners using four classic herbal medicines to treat dizziness, and deeply explore their medication patterns.

2. Information and methods

2.1. Source of prescriptions

The prescriptions were obtained from CNKI, and the advanced search page of CNKI was accessed, and the search terms were selected as the names of the first to fifth famous old Chinese medicine practitioners published on the official website of the State Administration of Traditional Chinese Medicine. The search term was "subject", the matching option was "fuzzy", and the search date was from the establishment of the journal to 2022-12-31, and the order was "publication date". After screening and excluding, 47 prescriptions containing Rhubarb, 74 prescriptions containing Aconite root, 46 prescriptions containing ginseng and 122 prescriptions containing Radix rehmanniae.

2.2. Inclusion criteria

(1) Meeting the diagnostic criteria for vertigo. (2) The prescriptions must contain rhubarb, or ginseng, or Aconite root, or Radix rehmanniae. (3) The drugs and dosages in the prescriptions are complete. (4) The prescription dosage form is not limited.

2.3. Data entry

The collected prescriptions were entered by two persons, one of whom entered the collected data into Excel 2019 software and the "Statistical Reporting System" in the "TCM Heritage Support Platform (V2.5)" software, and the other person reviewed the data to ensure the accuracy of the data. This is to ensure the reliability of the data mining.

2.4. Data processing

The drugs included in the prescriptions were standardised with reference to the 2020 edition of the Pharmacopoeia of the People's Republic of China^[8].

2.5. Data analysis

2.5.1. Frequency analysis

The data were classified according to the Four Classic Herbs, and the four different groups of data were entered into the "statistical report system" in four batches. After reviewing the correct data, the prescriptions containing Rhubarb, Aconite root, ginseng and Radix Rehmanniae were analysed in the "Statistical Reports" and "Data Analysis" sections for frequency of drugs, four qi and five tastes, attribution and dosage respectively.

2.5.2. Analysis of prescription patterns

Using association rule analysis, support and confidence levels were set. Due to the inconsistent number of prescriptions and the number of drugs contained in each type, it was not possible to standardise the number of supports and confidence levels. The values set must not be too high or too low. Therefore, after constant parameter pre-reading of prescriptions under each type, the final prescriptions containing Rhubarb, Aconite root, ginseng and Radix Rehmanniae (number of support/confidence) were set to (11/0.85), (20/0.85) (16/0.85) and (37/0.85), respectively, to analyse the association rules of medication between drugs.

3. Results

3.1. Top 10 statistics of the frequency of Chinese medicine application

Among the 47 prescriptions containing rhubarb, 141 Chinese herbal medicines were found to have a frequency of use. The top 10 in terms of frequency of use were rhubarb, *Gastrodia elata*, *Uncaria*, *Pinellia*, *Rhizoma alismatis*, *Poria cocos*, *Atractylodes macrocephala*, *Shijueming*, *Radix rehmanniae* and *Prunella vulgaris*; Out of the 74 prescriptions containing aconite, 146 drugs can be obtained. The top 10 drugs with highest to lowest frequency of use are Aconite root, *Atractylodes macrocephala*, *Poria cocos*, Licorice, *Radix paeoniae alba*, Cassia twig, *Rhizoma alismatis*, *Achyranthes bidentata*, *Cinnamomum cassia* and ginger; Among the 46 prescriptions containing ginseng, 130 drugs can be obtained in descending order of frequency. The top 10 drugs with the highest frequency of use are ginseng, licorice, *Astragalus membranaceus*, *Atractylodes macrocephala*, *Poria cocos*, *Gastrodia elata*, tangerine peel, *Angelica*, *Radix paeoniae alba* and *Pinellia*; Among 122 prescriptions containing *Radix Rehmanniae*, 158 kinds of drugs can be obtained from high to low frequency, and the top 10 are *Radix Rehmanniae*, *Cornus officinalis*, *Achyranthes bidentata*, *Poria cocos*, yam, *Lycium Chinensis*, *Gastrodia elata*, *Rhizoma alismatis*, *Angelica* and *radix paeoniae alba*.

3.2. Statistics on the frequency of attribution of the four gases and five tastes of Chinese medicine

Using the "Statistical Report" section, the statistics showed that among the prescriptions containing rhubarb, the frequency of using the four aromas of Chinese medicine was cold (256 times, accounting for 46.29%), followed by warm (135 times, accounting for 24.41%), flat (111 times, accounting for 20.07%), cool (47 times, accounting for 8.50%) and hot (4 times, accounting for 0.72%). The five tastes are most bitter (288 times, 34.33%), followed by sweet (264 times, 31.47%), pungent (169 times, 20.14%), salty (62 times, 7.39%), sour (42 times, 5.01%) and astringent (14 times, 1.67%); the main channels are liver, spleen, stomach and lung.

In the prescriptions containing Aconite root, the four aromas of the drug are warm (336 times, 38.18%), followed by cold (205 times, 23.30%), flat (203 times, 23.07%), hot (114 times, 12.95%) and cold (22 times, 2.50%); The five tastes are most sweet (558 times, 41.12%), followed by pungent (372 times, 27.41%), bitter (267 times, 19.68%), sour (87 times, 6.41%), salty (43 times, 3.17%) and astringent (30 times, 2.21%); the main channels are spleen, kidney, liver and heart.

In the prescriptions containing ginseng, the four aromas of the drug are warm most often (278 times, 47.85%), followed by flat (244 times, 24.78%), cold (122 times, 21%), cool (22 times, 3.79%) and hot (15 times, 2.58%); the five flavours are sweet most often (408 times, 44.2%), followed by bitter (230 times, 24.92%), pungent (190 times, 20.5%), and astringent (20 times, 20.5%). (190 times, 20.59%), sour (58 times, 6.28%), salty (20 times, 2.71%) and astringent (17 times, 1.84%); the main channels are spleen, liver, heart and lung.

Among the prescriptions containing *Radix Rehmanniae*, the four aromas of the drug are warm (580 times, 30.08%), followed by flat (417 times, 27.38%), cold (402 times, 62.40%), cool (86 times, 5.68%) and hot (38 times, 2.50%). The five flavours are sweet (1008 times, 42.66%), followed by bitter (491 times, 20.78%), pungent (422 times, 17.86%), sour (216 times, 9.14%), salty (113 times, 4.78%) and astringent (113 times, 4.78%); the main channels are liver, kidney, spleen and heart.

3.3. Analysis of the grouping pattern based on association rules

Association rule analysis commonly used drug combinations, Among prescriptions containing rhubarb, the combination of rhubarb and *Gastrodia elata*, rhubarb and *Uncaria*, rhubarb and *Pinellia* is the most common, as shown in Table 1 and Figure 1. For prescriptions containing Aconite root, the combination of Aconite root and *Atractylodes macrocephala*, Aconite root and *Poria cocos*, Aconite root and Licorice is the most frequent, see Table 2 and Figure 2. For prescriptions containing ginseng, the combination of ginseng and *Astragalus membranaceus*, ginseng and Licorice, ginseng and *Atractylodes macrocephala* is the most frequent, see Table 3 and Figure 3. For prescriptions containing *Radix Rehmanniae*, the combination of *Radix Rehmanniae* and *Cornus officinalis*, *Radix Rehmanniae* and *Poria cocos*, *Radix Rehmanniae* and *Achyranthes bidentata* is the most common, as shown in Table 4 and Figure 4.

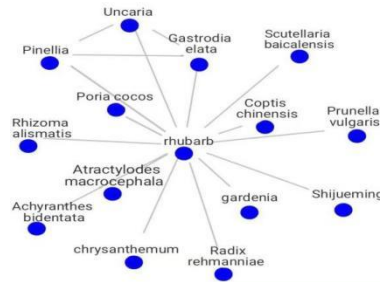


Figure 1: Network diagram of rhubarb related group association rules

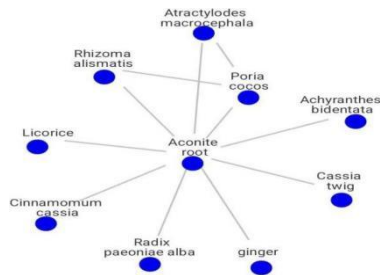


Figure 2: Network diagram of aconite root related group association rules

Table 1: Common combinations of related herbal medicines in rhubarb-containing prescriptions

Serial number	Herb combinations	Frequency	Serial number	Herb combinations	Frequency
1	Rhubarb and Uncaria	21	8	Rhubarb and Radix Rehmanniae	13
2	Rhubarb and Gastrodia elata	21	9	Scutellaria baicalensis and Rhubarb	13
3	Pinellia and Rhubarb	18	10	Prunella vulgaris And Rhubarb	13
4	Rhubarb and Rhizoma alismatis	17	11	Pinellia and Gastrodia elata	13
5	Rhubarb and Poria cocos	17	12	Pinellia and Rhubarb and Gastrodia elata	13
6	Atractylodes macrocephala and Rhubarb	14	13	Achyranthes bidentata and Rhubarb	12
7	Rhubarb and Shijueming	14	14	Uncaria and Gastrodia elata	12

Table 2: Common combinations of related herbal medicines in prescriptions containing Aconite root

Serial number	Herb combinations	Frequency	Serial number	Herb combinations	Frequency
1	Aconite root and Atractylodes macrocephala	40	7	Aconite root and Poria cocos and Atractylodes macrocephala	27
2	Aconite root and Poria cocos	38	8	Aconite root and Rhizoma alismatis	26
3	Aconite root and licorice	31	9	Aconite root And Achyranthes bidentata	23
4	Aconite root and Cassia twig	30	10	Aconite root and Gastrodia elata	21
5	Aconite root and radix paeoniae alba	30	11	Poria cocos and Rhizoma alismatis	21
6	Poria cocos and Atractylodes macrocephala	27	12	Aconite root and Poria cocos and Rhizoma alismatis	21

Table 3: Common combinations of related herbal medicines in prescriptions containing ginseng

Serial number	Herb combinations	Frequency	Serial number	Herb combinations	Frequency
1	Ginseng and Astragalus membranaceus	30	6	Atractylodes macrocephala and licorice	21
2	Ginseng and licorice	30	7	Ginseng and Atractylodes macrocephala and licorice	21
3	Ginseng and Atractylodes macrocephala	26	8	Ginseng and Astragalus membranaceus and licorice	19
4	ginseng and Poria cocos	23	9	Astragalus membranaceus and Gastrodia elata	19
5	ginseng and Gastrodia elata	21	10	Ginseng and Rhizoma alismatis	18

Table 4: Common combinations of related herbal medicines in prescriptions containing Radix Rehmanniae

Serial number	Herb combinations	Frequency	Serial number	Herb combinations	Frequency
1	Radix Rehmanniae And Cornus officinalis	76	6	Radix Rehmanniae And Gastrodia elata	47
2	Radix Rehmanniae And Poria cocos	51	7	Cornus officinalis and yam	44
3	Radix Rehmanniae and Achyranthes bidentata	51	8	Radix Rehmanniae and Cornus officinalis and yam	44
4	Radix Rehmanniae and yam	50	9	Radix Rehmanniae and Cornus officinalis and Lycium Chinensis	42
5	Radix Rehmanniae And Lycium Chinensis	50	10	Cornus officinalis and Lycium Chinensis	42

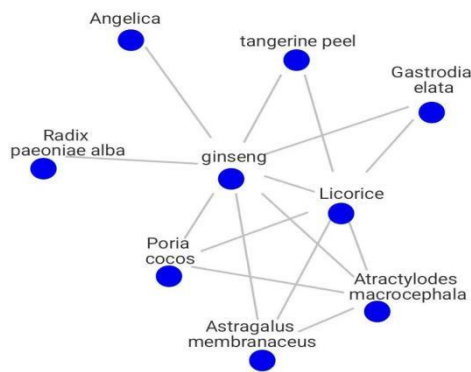


Figure 3: Network diagram of ginseng related group association rules

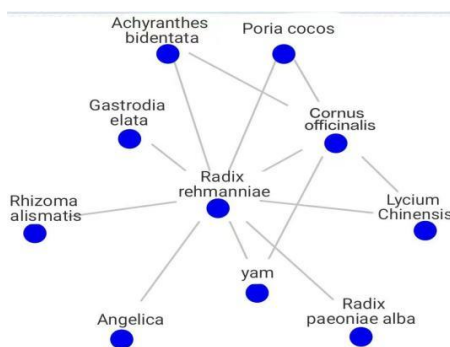


Figure 4: Network diagram of Radix Rehmanniae related group association rules

4. Summary

This study is based on the TCM heritage support platform, using the "Statistical Report" and "Data Analysis" sections to analyse the clinical experience of famous veteran Chinese medicine practitioners in using Four Classic Herbs for the treatment of dizziness. The following is an analysis of the data obtained from the platform and the experience of the famous veteran Chinese medicine practitioners.

4.1. Frequency analysis

According to the classification of drug efficacy, the top 10 high-frequency drugs in the four groups of prescriptions containing the Four Classic Herbs are mainly in six categories: first, qi-invigorating herbs, such as ginseng, licorice, *Astragalus membranaceus* and *Atractylodes macrocephala*; second, Blood tonifying medicine, such as *Radix rehmanniae*, *Angelica* and *Radix paeoniae alba*; third, Liver calming and wind calming medicine, such as *Gastrodia elata*, *Uncaria* and *Shijueming*; fourth, water-relieving and damp-permeating drugs, such as *Rhizoma alismatis* and *Poria cocos*; fifth, Chinese Herbs for Inner-Warming such as *Aconite root* and *Cinnamomum cassia*; sixth, other medicines, mostly related to clearing heat, resolving phlegm and moving Qi to invigorate Blood, such as *Rhubarb*, *Pinellia* and tangerine peel and *Achyranthes bidentata*. The treatment of dizziness by tonifying Qi and Blood, pacifying the Liver and calming the wind, warming the Kidney-Yang, dispelling dampness and resolving phlegm, and moving Qi and invigorating Blood demonstrates that in the use of medicines by renowned Chinese medicine practitioners, emphasis is placed on tonifying Qi and Blood in deficiency cases, while in real cases the pathological factors are first identified, followed by treatment to calm the wind, or clear heat, or resolve phlegm, or dispel blood stasis. This reflects the basic rule of treatment for vertigo.

4.2. Analysis of the Four Qi and Five Tastes

The four groups of prescriptions containing the Four Classic Herbs are, in general, mainly cold, warm and calm in their use of medicine. The cold herbs can clear heat and fire, relieve heat and relax the bowels, and treat heat symptoms; the warm herbs can nourish fire and promote yang, warm the interior and disperse cold, and treat cold symptoms^[9]; the flat herbs can harmonise yin and yang and ease deficiency, and can be used for both cold symptoms and heat symptoms^[10]. In prescriptions containing ginseng and *Radix rehmanniae*, most of the medicines used are mainly warming and pacific in nature. The combination of the two can warm the yang and open the blood vessels, while not harming the yang by promoting heat. This helps the body to maintain a state of "a balance of yin and yang". In prescriptions containing *Aconite root* and *Rhubarb*, the drugs used are mostly warming and cold in nature. Cold and warm medicines and the body's activities can be "mutually supportive and complementary", "Yin produces Yang, Yang grows, Yang kills and Yin hides"^[11]. The use of cold-warm and warming medicines together has positive significance for the treatment of vertigo.

All five flavours are mainly sweet, bitter and pungent. Sweet nourishes Qi, blood, yin and yang, fills the essence and generates marrow, and nourishes the brain, taking into account the nature of "deficiency" in patients with vertigo^[12]. The bitterness can remove liver fire, dry spleen dampness and preserve kidney yin; the pungency can move qi and invigorate blood, dispel evil and consolidate the root, which involves the "wind, fire, phlegm and blood stasis" of vertigo patients; the famous veteran herbalists often include pacific medicines in their treatment, which can address the mixed pathogenesis of vertigo and avoid using too warm and too cold medicines^[13]. The mechanism of vertigo is mainly characterized by deficiency syndrome, with empirical evidence as the table, and a combination of deficiency syndrome and empirical evidence^[14].

The meridian mainly belongs to the liver, spleen, and kidneys, followed by the lungs and heart. Vertigo mainly occurs in the liver, as the *Su Wen* says: "All winds and dizziness belong to the liver". At the same time, Yin deficiency of the liver and kidney, weakness of the spleen and stomach, and deficiency of the kidney essence are also closely related to vertigo attacks, but vertigo is not a disease of the liver alone, as all five organs can cause vertigo^[15]. Therefore, the liver, spleen and kidney should be the main focus of treatment, while other organs should be taken into account. The basic rule of treatment for dizziness can also be seen in the attribution of the meridians.

4.3. Analysis of association rules

Based on the frequency of drug combinations and association rules, the most common drug

combination in prescriptions containing rhubarb is rhubarb and *Gastrodia elata*. *Gastrodia elata* is sweet and mild in nature, calms the liver and stops dizziness, and is an important medicine for the treatment of dizziness; rhubarb is bitter and cold in nature, and has the effect of dispelling heat and relaxing the bowels, removing blood stasis and clearing the channels. The combination of the two is commonly used in *Gastrodia* and *Uncaria* Beverage with Addition and Reduction for the treatment of dizziness and dizziness, irritability and irritability caused by hyperactivity of Liver-Yang. The liver and kidney are tonified, the liver-yang is calmed and the dizziness is stopped. Wang Xinshun's formula uses *Gastrodia* and *Uncaria* Beverage Plus Decrease to treat hypertension caused by liver and kidney yin deficiency and hyperactivity of liver and yang, and all symptoms have been relieved without recurrence^[16]. In this formula, *Gastrodia elata* is used to calm the liver and subdue Yang, while Rhubarb is used to remove heat and relax the bowels. Modern studies have shown that the anti-inflammatory activity of rhubarb and its active ingredients can exhibit significant pharmacological activity against cardiovascular diseases through multiple pathways^[17]. The phenolic constituents of asparagine are effective in lowering blood pressure, and gastrodin can act in multiple ways in the treatment of cardiovascular-related diseases^[18].

The most common drug combination in prescriptions containing Aconite root is Aconite root and *Atractylodes macrocephala*. The bitter-warm nature of *Atractylodes macrocephala* strengthens the spleen and removes dampness, restoring the spleen and stomach's function of transportation and digestion. It is used to warm the lining and disperse cold. It is commonly used to treat dizziness, cold hands and feet caused by Yang deficiency and water flooding. The kidney yang is warmed, the spleen qi is strengthened, Water moisture elimination and the vertigo is relieved. The formula uses Aconite root to warm Yang and disperse cold, and *Atractylodes Macrocephala* to strengthen the spleen and promote water retention. Modern research has shown that *Radix et Rhizoma Atractylodis* is effective in cardiovascular treatment, lowering blood pressure and regulating blood lipids. *Atractylodes macrocephala*, as the subject medicine, is widely used in the treatment of vertigo due to inadequate blood supply to the vertebral basilar artery, with obvious efficacy^[19].

In prescriptions containing ginseng, the most common combination is ginseng and *Astragalus membranaceus*; both ginseng and *Astragalus membranaceus* taste sweet and are tonifying drugs that can nourish the spleen and stomach. The combination of the two herbs can benefit the qi and tonify the qi to promote blood flow, and also nourish the middle and strengthen the spleen to generate qi and blood^[20]. A common prescription is Modified Guipi Tang. Treating dizziness and weakness caused by deficiency of both Qi and Blood. With sufficient qi and blood, clear yang can be raised and the brain can be nourished, and dizziness will cease. In the clinical treatment of dizziness in elderly patients, Professor Duan Haichen often uses Modified Guipi Tang with addition and subtraction, with remarkable results^[21]. In this formula, ginseng and astragalus are used together to nourish Qi and blood. Modern research has shown that both ginsenosides^[22] and astragalosides^[23] have effects on preventing myocardial damage, protecting brain cells, and anti-inflammatory effects, and that they have various common targets in the treatment of cardiovascular and cerebrovascular diseases^[24].

The most common combination of *Radix Rehmanniae* and *Cornus officinalis* in prescriptions containing *Radix Rehmanniae* is sweet in taste, slightly warm in nature, and belongs to the liver and kidney meridians, with the effects of nourishing blood and nourishing yin and filling the marrow. The combination of the two herbs nourishes the liver and kidneys, generates essence and fills the marrow. A common formula is Liu Wei Di Huang Wan with reduction to improve dizziness, soreness and weakness of the waist and knees caused by deficiency of the liver and kidneys. Nourishing the liver and kidneys, nourishing the essence and generating marrow, and making the marrow sea sufficient to moisten the brain, the dizziness will stop. Professor Chen Guiwei used Liu Wei Di Huang plus and minus to treat dizziness caused by deficiency of the liver and kidney, with obvious clinical results^[25]. The formula uses *Radix Rehmanniae* to nourish Yin, tonify the kidney and fill the marrow, and *Cornus officinalis* to nourish the liver and kidney and astringent essence. Modern research has shown that the active ingredients of *Radix Rehmanniae* have protective activity for the liver and kidney^[26]. The cyclic enol ether terpene glycosides of *Cornus officinalis* have protective effects against liver damage^[27]. The combination of *Radix Rehmanniae* and *Cornus officinalis* can better exert its hepatoprotective and renal functions.

In conclusion, the clinical efficacy of using Four Classic Herbs of medicine in the treatment of vertigo is remarkable, reflecting the basic rule of treating vertigo by focusing on tonifying qi and blood in deficiency cases and distinguishing wind, fire, phlegm and stasis in real cases. The clinical experience of the famous veteran Chinese medicine practitioner is rich and of great significance.

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