

Ratio and Dosage Accuracy

Understanding the Proper Usage of Concentrated Chinese Herbal Granules

As a form of Chinese medicine, concentrated Chinese herbal granules have been used in medical practices for quite some time. In fact, their usage in the United States dates back even further than in China, the birthplace of Traditional Chinese Medicine (TCM). Unlike other forms of Chinese medicine, such as pills and capsules, concentrated Chinese herbal granules provide healthcare practitioners with a large number of commonly used single herbs. This enables practitioners to utilize them in essentially the same way as raw herbs, while still being in compliance with the principles and concepts of TCM: Diagnosis and treatment based on an overall analysis of the illness and the patient's condition.

There is an old saying that states, "The top secret of a formula is the prescribed dosage of each herb within the formula." If an accurate diagnosis is made and the correct formula prescribed, dosage accuracy is the critical factor directly affecting the efficacy of the treatment. In any given formula, the proportions of the individual herbs are crucial. These are described as "Monarch," "Minister," "Adjuvant," and "Messenger." While the absolute values of all single herb doses are extremely important, the "Monarch" herb is especially significant. For example, Chai Hu is prescribed as 2-5 grams for promoting and lifting Yang, about 10 grams for releasing Liver Qi stagnation, and more than 20 grams for penetrating the surface and relieving heat or fever (Source: <中医千古不传之秘—药性阴阳转变大法>). Unlike chemical pharmaceuticals, TCM does not involve the measurement of doses in milligrams, yet the difference between 9 grams and 18 grams of Gui Zhi is substantial in Gui Zhi Tang and Gui Zhi Jia Gui Tang:

Gui Zhi Tang: *Gui Zhi: 9 gm; Bai Shao: 9 gm; Sheng Jiang: 9 gm; Da Zao: 6 gm; Zhi Gan Cao: 6 gm*

Gui Zhi Jia Gui Tang: *Gui Zhi: 18 gm; Bai Shao: 9 gm; Sheng Jiang: 9 gm; Da Zao: 6 gm; Zhi Gan Cao: 6 gm*

How to prepare concentrated herbal granules with accurate dosages

Concentrated herbal granules are made from raw herbs; therefore, they cannot be dispensed in the same manner. A clear understanding of the concentration ratio is paramount to dosage accuracy. So how does 5:1 or 3:1 in the form of concentrated herbal granules translate? Let's start by examining the chemical concept of concentration.

Concentration refers to the measured amounts of solute and solvent within a solution. For instance, when completely dissolved, a 10% sugar solution or 70% medical alcohol solution will expose the actual amount of sugar or alcohol in the liquid. To increase concentration from 10% to 20%, we would either add more solute or reduce the amount of solvent. In herbal granule production, reducing the amount of solvent is a standard process for increasing concentration. Prolonged heating of 100 ml of a 10% sugar solution will cause the water to evaporate, reducing the total amount to 50 ml. During heating, the water evaporates, but the sugar remains (still dissolved in water with no solid sugar separated from the solution), causing an increase in concentration to 20%, as compared to the original 10% concentration. The sugar solution concentration is now doubled, with a concentration ratio of 2:1.

Referring back to concentrated herbal granules, let's review Gan Cao, or licorice. Gan Cao is the root and stalk of the Leguminous Glycyrrhiza plant. As a plant, Gan Cao is solid, and a concentration of Gan Cao cannot be derived using the aforementioned method. If you place Gan Cao in water, it can never be dissolved; neither the temperature nor the amount of water matters. A Gan Cao concentration can only

be created after heating the plant in water, during which time the plant's chemical components are released and can dissolve. A Gan Cao concentration, or its concentration ratio, is essentially an aqueous extract. While the Gan Cao plant contains many chemical components, including glycyrrhizin, licorice polysaccharide, and dozens more, not one of them can solely represent the plant from which it originated. Consider Gan Cao granules with a 5:1 concentration ratio. This means that 1 gram of concentrated granules contains all of the chemical components of Gan Cao or licorice; the same component amount found in 5 grams of decocted raw herbs using traditional methods. Patients will use 2 grams of concentrated Gan Cao granules rather than 10 grams of raw Gan Cao herbs.

Is a higher concentration ratio preferred?

Contrary to popular belief, a higher concentration ratio is not always preferred, and it is not indicative of a product's quality. A higher concentration ratio only indicates that, with the same amount of granules, a higher amount of chemical components has been extracted from the raw herbs. More importantly, highly concentrated granules may have an even smaller amount of certain chemical components. This is due to saturation.

Saturation is the point at which the solution of a substance cannot dissolve any more of that substance. This maximum concentration, or saturation point, depends on the temperature and pressure of the solution, as well as the chemical nature of the substances involved. Once the saturation point is reached, any additional amounts of the substance will appear as separated solid forms.

Gan Cao, for instance, contains various chemical components, all of which have different saturation points in water. During the concentration process, the total volume of water is decreased, and some low-saturation components will gradually separate and precipitate at the bottom. These components do not progress to the next step of production within the solution; thus, their actual amounts are lower in the final granule product.

Usage example for concentrated herbal granules

Having a clear and accurate ratio makes the regular use of concentrated herbal granules much easier and more effective. In the case of Gui Zhi Tang, the prescribed formula's raw herb dose is as follows:

Gui Zhi: 9 gm; Bai Shao: 9 gm; Sheng Jiang: 9 gm; Da Zao: 6 gm; Zhi Gan Cao: 6 gm

Using a 5:1 concentration ratio for conversion, the granule dosage is:

Gui Zhi: 1.8 gm; Bai Shao: 1.8 gm; Sheng Jiang: 1.8 gm; Da Zao: 1.2 gm; Zhi Gan Cao: 1.2 gm

The total granule amount is 7.8 gm.

As another example, the raw herb dosage of Gui Zhi Jia Gui Tang is:

Gui Zhi: 18 gm; Bai Shao: 10 gm; Sheng Jiang: 10 gm; Da Zao: 6 gm; Zhi Gan Cao: 6 gm

When we convert this into the granule dosage, it is:

Gui Zhi: 3.6 gm; Bai Shao: 2 gm; Sheng Jiang: 2 gm; Da Zao: 1.2 gm; Zhi Gan Cao: 1.2 gm

The total granule amount is 10 gm. (Formula source: <经方传真—胡希恕经方理论与实践>)

Therefore, the total amount of granules depends not only on the prescribed formula but also the concentration ratio.

Is there a “standard” daily dose for concentrated Chinese herbal granules?

Unfortunately, there is no clear “standard” daily dose for concentrated Chinese herbal granules. A presumed standard for daily dosing is 10 grams. However, we are unable to determine the source of this standard in order to determine what it was based upon or how it was established. Despite this, some manufacturers of Chinese medication have developed a calculation-based formula for this standard.

Let’s review how a formula is prepared using the “standard” 10 grams of granules for Si Jun Zi Tang, which contains Ren Shen: 9 gm; Bai Zhu: 9 gm; Fu Ling: 9 gm; and Zhi Gan Cao: 6 gm. This equates to a daily dosage total of 33 grams of raw herbs. Using the daily standard granule dose of 10 grams, a 10-day dosing of Si Jun Zi Tang provides 100 grams of total granules. Dividing 100 grams by 33 grams results in a parameter of 3. We then use the parameter (3) to multiply each single herb’s daily dose. This results in a 10-day total granule dosage for each single herb, as follows: Ren Shen: 27 gm; Bai Zhu: 27 gm; Fu Ling: 27 gm; and Zhi Gan Cao: 18 gm. Furthermore, dividing these total grams by the total 10-day time period yields a daily concentrated herbal granule amount for Si Jun Zi Tang of Ren Shen: 2.7 gm; Bai Zhu: 2.7 gm; Fu Ling: 2.7 gm; and Zhi Gan Cao: 1.8 gm.

Diving into this method further, we observe the case of Ren Shen. Ren Shen is one of the four raw herbs within Si Jun Zi Tang. In this case, Ren Shen granules have a concentration ratio of approximately 3:1 or 9 grams of raw herb vs. 2.7 grams of granules. Keeping the daily dose for the four herbs unchanged and adding two more herbs – Chen Pi and Ban Xia – results in Liu Jun Zi Tang as Ren Shen: 9 gm; Bai Zhu: 9 gm; Fu Ling: 9 gm; Zhi Gan Cao: 6 gm; Chen Pi: 9 gm; and Ban Xia: 12 gm for a total daily raw herb dose of 54 grams. Using the aforementioned method to calculate the dosage of granules, 10 days at 100 grams of granules divided by 54, provides a parameter of approximately 2. Continuing with the steps learned thus far, this equals a daily dose of granules for each herb as Ren Shen: 1.8 gm; Bai Zhu: 1.8 gm; Fu Ling: 1.8 gm; Zhi Gan Cao: 1.2 gm; Chen Pi: 1.8 gm; and Ban Xia: 2.4 gm. So in the Liu Jun Zi Tang formula, the Ren Shen granule ratio is 5:1 or 9 grams of raw herb vs. 1.8 grams of granules.

As such, there are two ratios for the same Ren Shen granules when one patient takes Si Jun Zi Tang and another Liu Jun Zi Tang, as prescribed above. Each patient receives the same dose of Ren Shen in raw herb form, 9 grams daily; however, when using granules, one receives 2.7 grams and another only 1.8 grams. Can we expect efficacy if the actual patient intake is not the exact dose as prescribed?

Do vendors’ standards make sense?

Vendors have also developed their own “standards” and methods for calculating the proper usage of concentrated Chinese herbal granules.

Note the following example of how Ma Huang Tang is calculated and prepared using a vendor’s set daily granule dose of 6 grams.

	Herb daily dose in raw herbs	Percentage of each herb	Herb daily dose in granules	10-day total dose in granules
Ma Huang	6 gm	30%	1.8 gm	18 gm
Gui Zhi	4 gm	20%	1.2 gm	12 gm
Xing Ren	8 gm	40%	2.4 gm	24 gm
Gan Cao	2 gm	10%	0.6 gm	6 gm
Total	20 gm	100%	6 gm	60 gm

In the Ma Huang Tang formula, the concentrated herb ratio is about 3.33:1. While leaving the dose of each herb unchanged, Bai Zhu is added to make a Ma Huang Jia Zhu Tang formula using the same type of calculation:

	Herb daily dose in raw herbs	Percentage of each herb	Herb daily dose in granules	10-day total dose in granules
Ma Huang	6 gm	21.4%	1.28 gm	12.8 gm
Gui Zhi	4 gm	14.3%	0.86 gm	8.6 gm
Xing Ren	8 gm	28.6%	1.72 gm	17.2 gm
Gan Cao	2 gm	7.1%	0.43 gm	4.3 gm
Bai Zhu	8 gm	28.6%	1.72 gm	17.2 gm
Total	28 gm	100%	6.01 gm	60.1 gm

In the Ma Huang Jia Zhu Tang formula, the concentration ratio is changed to 4.65:1. Again, the same vendor's granules in two different formulas result in different ratios. Once the concentrated Chinese herbal granules are produced in the factory, all of the chemical components are unchangeable.

As illustrated above, we can clearly see that the patients taking Liu Jun Zi Tang and Ma Huang Jia Zhu Tang do not receive their prescribed herbal doses. Therefore, the efficacy of herbal treatment becomes an issue, and the so-called "standard" isn't in compliance with the principle and philosophy of TCM.

The total amount of granules depends on the formula prescribed (number of herbs and their daily dose) and the granule ratio, and the formula prescribed is based on each patient's symptoms and conditions. In some cases, practitioners may reduce the dosage of certain herbs, reducing the amount of granules accordingly.

Does a concentrated herbal formula ratio exist?

In researching that answer, there are a couple of things to remember. The production of a granulated formula is the same as that of a single herbal granule. In the production of a particular formula, all raw herbs are decocted together to make an extraction. The extract then goes through a concentration, spray-drying, and granulation process. As previously described, for single herbs, a 5:1 ratio means 1 gram of granules is equivalent to 5 grams of raw herbs. However, it is misleading to use a 5:1 ratio for granulated formula, as illustrated in the case of Gui Zhi Tang. Gui Zhi Tang formula is not a single herb, but rather a decoction of five different herbs. These five herbs include Gui Zhi, Bai Shao, Sheng Jiang, Da Zao, and Zhi Gan Cao. Each herb in Gui Zhi Tang varies in terms of its dose, so 1 gram of Gui Zhi Tang granules will not equal 5 grams of each herb. In addition, the dosage of each herb in Gui Zhi Tang is often prescribed differently from one doctor to another.

How to correctly use granulated herbal formula

First, it is imperative to check all herbs and dosages for a given granulated formula to confirm that they are the same as or close to either the "Classic Formula" or the specific formula prescribed by the individual practitioner. Even if the formula name is the same, manufacturers produce granulated formulas differently. This includes the combination of herbs and the dosages of each single herb. For Xiao Chai Hu Tang, some may use Ren Shen, while others may utilize Dang Shen. For Si Wu Tang (containing Shu Di Huang, Dang Gui, Bai Shao, and Chuan Xiong), some factories may include all four herbs in equal amounts, while others may add more Shu Di Huang than the remaining three herbs.

Second, and most importantly, we must understand the “Serving Size” in any given granulated formula. The Serving Size provides detailed dosage information for all herbs within that formula and can be expressed as either per gram or per 10 grams. When we review a particular brand (“Brand A”) and its Gui Zhi Tang granules, we see the following on the label:

“Serving Size: 10 grams. Each 10 grams of concentrated granules is equivalent to Gui Zhi: 10 gm; Bai Shao: 10 gm; Sheng Jiang: 10 gm; Dao Zao: 6 gm; and Zhi Gan Cao: 6 gm.”

This tells us that dissolving 10 grams of Brand A’s Gui Zhi Tang granules is equivalent to decocting together Gui Zhi: 10 gm; Bai Shao: 10 gm; Sheng Jiang: 10 gm; Dao Zao: 6 gm; and Zhi Gan Cao: 6 gm (using the traditional method, of course). Practitioners, therefore, must determine the correct Serving Size of granules for patients accordingly. In addition, they may also consider adding certain amounts of single herb granules to achieve the desired dose.

To further demonstrate how to use granulated formula using Brand A’s Gui Zhi Tang, if we were to prescribe Gui Zhi Tang in a raw herb dose as:

Gui Zhi: 9 gm; Bai Shao: 9 gm; Sheng Jiang: 9 gm; Da Zao: 6 gm; Zhi Gan Cao: 6 gm

Then one Serving Size, or 10 grams, of Brand A’s Gui Zhi Tang granules would be used instead of mixing together five single herbal granules, as previously described.

If we were to use Professor Huang Huang’s recommended Gui Zhi Tang prescription, as follows:

Gui Zhi: 15 gm; Bai Shao: 15 gm; Sheng Jiang: 15 gm; Da Zao: 20 gm; Zhi Gan Cao: 10 gm

Three times a day

Each time, the patient would take only Gui Zhi: 5 gm; Bai Shao: 5 gm; Sheng Jiang: 5 gm; Da Zao: 6.6 gm; and Zhi Gan Cao: 3.3 gm. Therefore, converting this into Brand A’s granule usage, we would administer only about half of the Serving Size, or 5 grams of granules, to the patient. In addition, because the Da Zao dose is actually lower in Brand A’s Gui Zhi Tang, we would add about 0.7 grams of Da Zao granules (assuming a 5:1 concentration ratio for Da Zao granules).

Conclusion

In general, a granulated formula is made by decocting all raw herbs together before concentrating and drying them into granule form. This provides an unparalleled uniformity that is far better than mixed single herb granules. Its superiority lies in its simplicity. The majority of granulated formulas contains numerous single herbs. Granulated formulas allow patients to take smaller amounts, especially when prescribed in large or multi-formula doses. Once we understand the key elements and production method, it becomes quite clear: Using a granulated formula is simpler, easier, and more effective.

Have questions or comments? Please contact Danny Qiu

Phone: 908-456-2966 Email: danny.qiu@ezmdsupply.com