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Effects of Different Processing Methods on The Active Ingredients of Interior Warming Medicines

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ABSTRACT

Processing drugs of traditional Chinese medicine is a kind of processing of Chinese herbal medicines, which can assist in adjusting the medicinal properties, reducing the toxicity of medicines, purifying the medicinal herbs, and increasing the therapeutic efficacy. In recent years, in addition to the process of processing itself and the clinical efficacy of the artillery products, there have been a considerable number of studies focusing on the effects of the active ingredients of Chinese medicines before and after concocting. In this paper, we summarize the relevant literature on the effects of Chinese medicine processing on the active ingredients of Chinese medicines in recent years, and explore the effects of different processing methods on the active ingredients of Interior warming herbs under the traditional classification of Chinese medicines, with the intention of providing certain reference value for the field of Chinese medicine processing.

KEYWORDS

Processing drugs; Interior warming medicines; Active ingredients

1. THE EFFECT OF PROCESSING DRUGS ON THE COMPONENT OF INTERIOR WARMING MEDICINES

1.1. Main Active Ingredients of Interior Warming Medicines

Interior warming medicines are mostly pungent in flavor. Modern research suggests that the "pungent" flavor is related to the volatile oil contained in the drug, which reflects its pungent dispersing nature. Research has shown that the chemical composition of other warming herbs except epiphyllum clearly contains volatile oils [1]. The research shows that the chemical composition of other warming herbs except epiphyllum contains volatile oil. Therefore, one of the main active ingredients of interior warming medicine is volatile oil. Secondly, alkaloids also occupy a certain proportion in the active ingredients of interior warming medicine. For example, alkaloids in common monkshood root are both active and toxic components, among which diterpenoid alkaloids are the main pharmacological material basis [2]. The diterpenoid alkaloids are the main material basis of medicinal effect. Flavonoids are also present as active ingredients in most of the warming medicines.

In addition, organic acids, cardiac glycosides, steroids, coumarins, and sugars are prevalent in warming herbs [3].

1.2. Changes in the Active Ingredients of Interior Warming Medicines Before and After Different Processing Methods

1.2.1. Volatile oil

Research shows that the volatile oil composition of dried ginger and its artillery products is related to the cutting method [4]. The volatile oil composition of dried ginger and its concocted products is related to the slicing method, the volatile oil yield of dried ginger slices prepared by the fresh slicing method is higher than that of dried ginger slices prepared by the traditional slicing method; dried ginger slices prepared by the above two processing methods were concocted to baked ginger and ginger charcoal, and the volatile oil yield of the baked ginger and ginger charcoal prepared by the two slicing methods was closer when compare to themselves, but the volatile oil yield of ginger charcoal produced by the two slicing methods was significantly lower than that of baked ginger produced by the two slicing methods.

For cinnamon, the experimental results showed that the loss of volatile components of cinnamon under the traditional processing was larger, while the decompression steam braised moistening processing was able to make the loss of volatile components smaller [5]. Li Jia et al. [6] pointed out that dried cinnamon had the strongest aroma and the highest content of cinnamon oil and cinnamaldehyde; sun-dried cinnamon had a light aroma and a lower content of cinnamon oil and cinnamaldehyde; and cinnamon dried after braising had a better color, a stronger aroma, and a higher content of volatile oils and cinnamaldehyde (about 10% higher) than cinnamon dried directly.

For evodiae fructus, the volatile oil constituents showed different degrees of changes under different processing methods. The species of volatile oil of the herb was significantly reduced in all the other methods (licorice-produced, boiling water soaked, and Chinese -goldthread-rhizome-produced), except for the water stir-fried of Chinese goldthread rhizome [7].

The volatile oil constituents contained in all products of cumin are mainly aromatic, followed by terpenoids. Li Hongwei et al. [8] studied five processing methods of cumin, and the results showed that, compared with raw cumin, the five methods increased the number of volatile oil components detected and identified, and at the same time reduced the volatile oil extraction rate, with the decreasing effect in the following order: salt-produced>fried>cantharides-produced>wine-processed>morning-glory-seed-produced, with the salt-produced decreasing by more than 20.0%. Salt-produced and wine-processed increased the number of volatile oil components, while the other methods reduced them; salt-produced and morning-glory-seed-produced increased the relative content of aromatic components and decreased the relative content of terpene components; wine-processed and morning-glory-seed-produced increased and decreased the relative content of terpene components, respectively.

The main volatile components in Chinese prickly ash are linalool, limonene and linalyl acetate. The volatile oil content is highest in raw products, and decreases in stir-fried products, vinegar-processed products, salt-produced products and wine-processed products [9]. For the volatile components in the Chinese prickly ash, the effects of stir-frying and salt-producing were relatively small, the contents of linalool and limonene increased significantly after vinegar-processing, and the volatile substances were easily evaporated with water vapor by the prolonged high-temperature heating process in the wine-processing, which resulted in the lowest contents of the above three volatile substances, indicating that the different heating methods and the auxiliaries of the concoctions had certain effects on the volatile components of the Chinese prickly ash [10]. In addition, the decrease in the volatile components after stir-frying indicates that some of the thermally unstable volatile components are volatilized with the increase in temperature during the stir-frying and heating process, which confirms the effect of reducing the toxicity of Chinese prickly ash after processing [11].

1.2.2. Alkaloid

The contents of evodiamine and rutaecarpin minor in the alkaloid constituents of evodiae fructus were reduced by different processing methods (licorice-produced, boiling water soaked, Chinese-goldthread-rhizome-produced, Chinese-goldthread-rhizome-water-stir-fried and salt-produced) [12]. The content of Chen Lu et al. [13] calculated and compared the alkaloid contents of various concoctions and raw products of evodiae fructus, and the results, in descending order of alkaloid content, were as follows: Chinese-goldthread-rhizome-water-stir-fried product> Chinese-goldthread-rhizome-produced product > raw product > boiling water soaked product, and boiling water soaking decreased the total alkaloid content of evodiae fructus, while it was elevated about 16.87% by the method Chinese-goldthread-rhizome-water-stir-fried. Jiang Shan et al. [14] showed that during boiling water soaking, the contents of evodiamine, rutaecarpin, evocarpine and dihydroevocarpine fluctuated, with an overall increase; the content of dehydroevodiamine decreased significantly, which further revealed the changes in the contents of each alkaloid of boiling water soaked evodiae fructus.

The alkaloids in common monkshood root, which are both active and toxic components, to convert its highly toxic diester alkaloids into low-toxicity benzoyl monoester alkaloids is the mechanism of processing [15]. Therefore, the total alkaloid content of raw common monkshood root is the highest compared with other artillery products. Kuang Qingfen et al. [16] found that there was an interconversion between monoester alkaloids and diester alkaloids in common monkshood root before and after processing; except for the raw product, the contents of diester alkaloids in each product of common monkshood root in descending order were white common monkshood root slice, steamed common monkshood root slice, fried common monkshood root slice, and cooked common monkshood root slice.

For the total alkaloid content of the Chinese prickly ash, the salt-produced product decreased compared with the raw product, while the stir-fried product, vinegar-processed product and wine-processed product increased [11]. Wang Meng et al. [17] studied Sichuan pepper, a local medicinal material of Chinese prickly ash, in depth and found that its active ingredient, chelerythrine, had the highest content in wine-processed products, followed by stir-fried products and vinegar-processed products, and lower content in salt-produced products and raw products, indicating that the variation of alkaloid content in Sichuan pepper's processing products had a close relationship with the auxiliaries used in processing, and was also closely related to the effects of different processing methods on alkaloid dissolution and solubilization.

1.2.3. Flavonoids

Similar to the alkaloid constituents, the flavonoid constituent’s quercetin, hyperin, isorhamnetin-3-O-rutinoside, and rutin in evodiae fructus were all reduced after being processed in different methods (licorice-produced, boiling water soaked, Chinese-goldthread-rhizome-produced, Chinese-goldthread-rhizome-water-stir-fried and salt-produced) [12]. The content of Jiang Shan et al. [14] pointed out that the contents of chlorogenic acid, hyperin, isorhamnetin-3-O-rutinoside, and isorhamnetin-3-O-galactoside of evodiae fructus were significantly reduced during the process of hot-water-washing.

The flavonoid component of cumin is also one of its major non-volatile components. Li Min et al. [18] found that the salt water ratio had basically no effect on the contents of lilac glucoside (SG) and quercetin-3-O-glucuronide (QG) in salted cumin; the contents of flavonoids gradually decreased with the increase of the processing temperature and the prolongation of the processing time.

1.2.4. Something else

The six main gingerol active ingredients contained in dried ginger include gingerone, 6-gingerol, 8-gingerol, 6-gingerenol, diacetoxy-6-gingerdiol and 10-gingerol, of which gingerone is a newly generated compound after processing. Lin Huajian et al. [19] found that in comparison with baked ginger and ginger charcoal, which are the artillery products of dried ginger, the content of gingerone

increased while the content of 6-gingerol, 8-gingerol, 6-gingerol, 6-gingerolenol, diacetoxy-6-gingerol and 10-gingerol decreased with the degree of processing.

For galangal, which also belongs to the ginger family, Deng Xianmei et al. [20] showed that compared with the raw product, the content of galangin and the percentage of water-soluble extracts of salt-roasted galangal increased, while the types of chemical components decreased, but the similarity of the samples before and after salt-roasted was high, generally above 0.90. The reason may be that the high temperature of salt-roasting changed the chemical composition of the slices, or the accessories, salt, regulated the osmotic pressure of the cells in the slices, or the slices became crispier after being moistened with brine, which ultimately affected the leaching of the constituents in the slices.

2. SUMMARY

Through the examination of several literatures, I was summarized that most of the main active ingredients in interior warming medicines, which volatile oils, alkaloids and flavonoids, were reduced to different degrees after different processing methods. Among them, there are also cases in which processing increases the detection and types of active ingredients but decrease the extraction rate, such as the volatile oil in cumin [8] Other active ingredients that can reflect the pungent flavor of interior warming medicine, such as gingerol in dried ginger and galangal [19, 20], also showed the pattern mentioned above after processing.

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