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# Preparation and quality testing of hard capsule

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## Abstract

**The preparation of hard capsule of Traditional Chinese medicine lies in the treatment and filling of medicinal materials. Empty capsule and contents Preparation The empty capsule is divided into two sections, called the capsule cap and the capsule body respectively. Empty capsules are divided into colorless transparent, colored transparent and opaque three types according to whether there is color. In order to make the filled capsule appearance beautiful, bright, can spray a little liquid paraffin clean gauze gently roll, wipe the adhesive powder outside the capsule. The results showed that :(1) it can cover up the bad smell of drugs, reduce the irritation of drugs, and is easy to take; (2) Compared with tablets and pills, it disintegrates and dissolves quickly in gastrointestinal tract, with good absorption and high bioavailability; (3) The drug is filled in the capsule, isolated from light, air and moisture, which can improve the stability of the drug; (4) Capsules with different release speeds and release modes can be prepared to release drugs at a fixed time.**

## Keywords

**Hard capsule; Hydrochloric acid; Disintegration time limit.**

## 1. Introduction

Capsule refers to a solid preparation made by filling a hollow capsule or sealing in a soft capsule with auxiliary materials. Mainly for oral use, can also be used for rectum, vagina, etc[1-2]. The main material of empty capsules is gelatin, and methyl cellulose, alginate, polyvinyl alcohol, modified gelatin and other polymer compounds can be used to change the solubility of capsules or achieve the purpose of intestinal dissolution. According to the hardness and dissolution and release characteristics of capsule, capsule can be divided into hard capsule and soft capsule, enteric-soluble capsule and sustained-release capsule. Hard capsule is a solid dosage form made by filling a hard capsule[3]. The preparation of hard capsule of Traditional Chinese medicine lies in the treatment and filling of medicinal materials. According to the different nature and volume of medicinal materials, the medicinal materials can be crushed into fine powder or made into semi-extract and extract powder, directly filled with, or the powder can be made into particles or pellets for filling. The preparation process of hard capsule is as follows: empty capsule preparation → drug treatment → drug filling → capsule sealing → powder removal and polishing → quality inspection → packaging[4-5]. The key point of filling is to fill evenly. For the powder with poor fluidity, appropriate auxiliary materials can be added or made into particles to increase its fluidity, reduce drug stratification and ensure accurate loading. Filling methods are manual filling and mechanical filling two.

The preparation of hard capsule of Traditional Chinese medicine lies in the treatment and filling of medicinal materials. The general preparation process of hard capsules is as follows: preparation of empty capsules and contents → filling of empty capsules → quality inspection → packaging 1. Empty capsule and contents Preparation The empty capsule is divided into two sections, called the capsule cap and the capsule body respectively. Empty capsules can be

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divided into colorless transparent, colored transparent and opaque three types according to whether there is color[6]. According to the type of lock, it can be divided into two types: common type and lock mouth type. According to the size, it is divided into eight specifications of 000, 00, 0, 1, 2, 3, 4 and 5, of which 000 is the largest and 5 is the smallest. Contents can be prepared into different forms according to drug properties and clinical needs, mainly including powder, granule and pellet. 2. Filling empty capsule mass production can be filled with automatic capsule filling machine to fill drugs, filled drugs using capsule polishing machine to remove the fine powder adsorbed on the outer wall of the capsule, make the capsule smooth. Small amount of trial production can be used for capsule filling plate or manual filling drugs, filled capsules with clean gauze wrapped, gently rub and roll, make the capsule bright. 3. Quality inspection the filled capsules shall be checked for content determination, disintegration time limit, difference in loading amount, moisture, microbial limit and other items. The difference of capsule volume inspection method: take 20 samples, weigh them accurately, pour out the contents, and wipe hard capsules with a small brush or other appropriate appliances; Then, the weight of the capsule shell was precisely weighed, and the filling volume (M1) and the average filling volume (M2) of each grain content were calculated, and the filling volume difference was equal to M1-m2 /M2. According to the regulation, the quantity difference limit shall not be more than 2, and there shall not be 1 grain more than 1 times the limit. 4. After the quality inspection of packaging and labeling is qualified, the products shall be packed in appropriate clean containers and labeled with appropriate labels[7]. Filling hard capsules should be noted that the pressure in the filling process should be uniform, but also should be weighed at any time to make each capsule accurate volume. In order to make the filled capsule appearance beautiful, bright, can spray a little liquid paraffin clean gauze gently roll, wipe the adhesive powder outside the capsule.

## 2. Materials and production methods

In this experiment, the hard capsule was prepared by mixing medicine and suitable auxiliary materials evenly and filling with capsule plate manually. The finished products shall be inspected according to the relevant provisions in the general Rules of capsules of Chinese Pharmacopoeia 2015 edition.

Main drugs, reagents and equipment: berberine hydrochloride, starch, magnesium stearate, capsule filling plate, granulating screen, oven, capsule shell 0.

### 2.1. Preparation of capsules

Take berberine hydrochloride pulverize, pass 80 mesh sieve, mix evenly with starch, add starch slurry appropriate amount, mix to make soft material, press through 80 - 100 mesh sieve granulation, dry at 60-70℃, whole grain, add magnesium stearate, mix evenly.

Insert the capsule body into the capsule board, put the powder on the capsule board, gently knock the capsule board, make the powder fall into the capsule shell, until all the capsules are filled with powder, put on the capsule cap.

### 2.2. Quality inspection

(1)The surface is smooth and neat, no adhesion, deformation and rupture, no smell.

(2)Check quantity difference

The difference limit of capsule loading should conform to the following table1.

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Table1 Limit table of difference in capsule loading

| Average volume of capsule content | Limit of difference in loading capacity |
|---|---|
| Below 0.3 g | ±10% |
| 0.3g or above | ±7.5% |

Inspection method: Take 20 samples, weigh them accurately, pour out the contents (no loss of capsule shell), wipe the hard capsule shell with a small brush or other appropriate tools (such as cotton swabs, etc.), and then weigh the weight of capsule shell accurately, and get the contents of each sample and the average weight. No more than 2 capsules shall exceed the limit of difference in the amount of each capsule compared with the average amount. No one grain shall exceed 1 time of the difference limit.

### 2.3. Disintegration time limit

Unless otherwise specified, 6 samples shall be taken. All samples shall disintegrate within 30 minutes and pass through the screen (except for capsule shell fragments). If 1 sample cannot pass all tests, another 6 samples shall be taken for retest, all of which shall meet the requirements.

## 3. Results and Analysis

### 3.1. Quality inspection

Take berberine hydrochloride pulverize, pass 80 mesh sieve, mix well with starch, add starch slurry appropriate amount, mix to make soft material, berberine hydrochloride 10g, starch 10g, starch slurry (10%) appropriate amount, magnesium stearate 0.15g, a total of 50 granules.

Sample material surface is required to be smooth, clean, no adhesion, deformation and rupture, no smell.

(1)0.396-0.125=0.271g (2)0.384-0.129=0.255g (3)0.390-0.129=0.261g
(4)0.385-0.124=0.261g (5)0.388-0.129=0.259g (6)0.395-0.124=0.271g
(7)0.382-0.131=0.251g (8)0.383-0.130=0.253g (9)0.390-0.130=0.260g
(10)0.396-0.125=0.271g (11)0.388-0.127=0.255g (12)0.388-0.130=0.258g
(13)0.385-0.132=0.253g (14)0.390-0.126=0.264g (15)0.383-0.129=0.254g
(16)0.384-0.134=0.250g (17)0.392-0.126=0.266g (18)0.382-0.129=0.251g
(19)0.385-0.133=0.252g (20)0.391-0.126=0.265g

After comparison of the results, the above 20 grains were all below the difference limit of loading, in line with the provisions.

### 3.2. Disintegration time limit

Disintegration refers to the solid preparation under the specified conditions of all disintegrating dissolved or broken particles, except insoluble coating material or broken capsule shell, should all pass through the screen. If a small amount cannot pass through the screen, but has been softened or light float and no hard core can be made in accordance with the provisions.

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Figure 1 Post-experimental drug

According to the experiment, all the above 6 granules disintegrate and pass through the screen within 30min, in line with the requirements

## 4. Conclusion

Capsule has the following characteristics:

Can cover up the bad smell of drugs, reduce the irritation of drugs, easy to take;

Compared with tablets and pills, it disintegrates and dissolves quickly in gastrointestinal tract, with good absorption and high bioavailability;

The drug is filled in the capsule, isolated from light, air and moisture, which can improve the stability of the drug;

Capsules with different release speeds and release modes can be prepared to release drugs at a fixed time, After the quality inspection of paracetamol tablets, the appearance inspection is qualified. According to the provisions of pharmacopoeia, the weight difference limit of 0.3g tablets is ±7.5%, 0.3g or 0.3g above is ±5%, all the limits are less than 5% after calculation test; Hardness is 100.5g; According to the regulations, the weight loss rate should not exceed 0.8%, and two agents failed.

## References

[1] Chen W, Zheng R, Baade P D, et al. Cancer statistics in China, 2015.[J]. Ca A Cancer Journal for Clinicians, 2016, 66(2):115.

[2] Lee, S.S, Su, W. C, Liu, K. C. J. Nat. Prod. 1991, 54 (2), pp. 615-618

[3] Robert H. Cichewicz, Samir A. Kouzi. Chemistry, biological activity, and chemotherapeutic potential of betulinic acid for the prevention and treatment of cancer and HIV infection. Med Res Rev, 2004, 24(1) : 90-114.

[4] Apichart Suksamrarn. et al. Antiplasmodial triterpenes from twigs of Gardenia saxatilis.Journal of Ethnopharmacology. 2003, 88, 275–277.

[5] Chou R. Pharmacological management of low back pain [J]. Drugs, 2010, 70(4): 387-402.

[6] Sareen S, Mathew G, Joseph L. Improvement in solubility of poor water soluble drugs by solid dispersion[J]. International Journal of Pharmaceutical Investigation, 2012, 2(1):12.

[7] Chen, C.; Luo, G. D.; Hu, R.; Fu, H. Z. J. Journal of Chinese Pharmaceutical Sciences, 2016,02: PP. 111-115.