

DECOCTION OF TRADITIONAL CHINESE MEDICINE AND PREPARATION METHOD THEREFOR

The present application Claims for the priority benefit of the Chinese Patent Application CN201610364217.X with the Application Date of May 27, 2016. The present application makes reference to the full text of the Chinese Patent Application above.

BACKGROUND OF THE INVENTION

[0001] Technical Field

[0002] The invention relates to a traditional Chinese decoction and a preparation method thereof.

[0003] Description of Related Art

[0004] The method of decocting with water in the traditional Chinese medicine has a history of more than 2,000 years, which is a traditional treatment method for the Chinese, and the Traditional Chinese medicine has also been recognized worldwide for its advantages such as no side effects, energy consolidation and constitution consolidation. However, the traditional Chinese method of decocting the traditional Chinese medicines with water has to be conducted several times for boiling over a slow fire with long boiling time, making it impossible for industrial production; and the obtained traditional Chinese decoction has the absorption rate of less than 5% in the human intestinal tract, cannot be preserved fresh and carried around, and is troublesome to take. For a variety of these reasons, the traditional Chinese medicine decoction has been slowly replaced by western medicines. At present, there is no ideal industrial production method developed for the traditional Chinese medicine in the prior art, which can improve the absorption rate and prolong the preservation time for the traditional Chinese medicine decoction.

BRIEF SUMMARY OF THE INVENTION

[0005] The technical problem to be solved by the invention is to overcome the defects that the traditional Chinese medicine decoction has a very low absorption rate in the human intestinal tract and cannot be preserved fresh, and the decoction method thereof is unavailable for industrial production. The invention provides a traditional Chinese medicine decoction and a preparation method thereof. The preparation method provided by the invention is simple and practicable, and can realize the industrial production of the traditional Chinese medicine decoction, and the traditional Chinese medicine decoction obtained therewith have the absorption rate as high as 90% or more in the human intestinal tract, and can be preserved at room temperature for 24 months.

[0006] The invention adopts the following technical solution to solve the above technical problems.

[0007] The invention provides a preparation method of a traditional Chinese medicine decoction, comprising the following steps:

[0008] (1) mixing Chinese herbal medicines and water, and decocting to obtain a mixture;

[0009] (2) cooling the mixture, shearing and crushing twice, and then filtering with a 400-500-mesh sieve;

[0010] (3) performing first heating on the decoction obtained from Step (2) to 70-85°C and then homogenizing, and performing second heating to 85-95°C and then performing second homogenizing; and

[0011] (4) canning the decoction obtained from Step (3) at 80-90°C, and sterilizing at high temperature.

[0012] In Step (1), a mass ratio of the Chinese herbal medicines to water is as conventionally described in the art, and preferably (1-10):(10-90).

[0013] Moreover, the water has the conventional meaning in the art, and is

preferably deionized water.

[0014] In Step (1), a device used for the decocting is preferably a stainless steel cooking pot. The decocting is the conventional operation in the art, and preferably comprises the following substeps: heating to 40-60°C, soaking for 1-10 hours, heating to 90-100° C again, and boiling for 1-5 hours.

[0015] In Step (2), the cooling preferably refers to cooling to 60-80°C.

[0016] In Step (2), the shearing and crushing twice preferably comprises first shearing and crushing and second wet-process ultrafine grinding. The first shearing and crushing is preferably performed in a cutting-type wet-process ultrafine crusher. The second shearing and crushing is preferably performed in a wet-process ultrafine grinding mill. A mixture from the first shearing and crushing preferably has the granularity of 100-200 meshes. A mixture from the second wet-process ultrafine grinding preferably has the granularity of 400-500 meshes.

[0017] Moreover, the cutting-type wet-process ultrafine crusher has been widely applied to the ultrafine wet-process crushing for aquatic products, oatrim, as well as soft fibers and residues of fruits, vegetables, juice and seasonings among food materials. To meet the requirements of wet-process ultrafine crushing of materials, the device makes full use of the strong shearing effect of the mechanical shearing force on the soft fibers of the residues in the materials; the stator and rotor arrangement of the device is fully based on the advanced foreign concept of controlled ultrafine cutting device, of which the following core elements are mastered: one is to use ultrahigh linear velocity to create strong shearing force for shearing the materials having soft fibers, with remarkable crushing effect; the other is to use ultrafine backlash to control the fineness of the material to be crushed so as to meet the requirements of ultrafine crushing. A suction type blade ensures that the materials are smoothly sucked in the flowing state to complete the ultrafine grinding.

[0018] In Step (2), a device used for the filtering is preferably a stainless steel

filter screen. The stainless steel filter screen has 400-500 sieve meshes.

[0019] In Step (3), the first heating is preferably performed in a pasteurizer.

[0020] In Step (3), the homogenizing is preferably performed in a high-pressure homogenizer. The pressure for the homogenizing is preferably below 60MPa. The homogenizing process is to raise the temperature of the materials to 70-85°C, at which a homogenizing effect is available for mixing the materials with the water, and the fat and the essential oil in the traditional Chinese medicine decoction can be subjected to water-soluble polymerization.

[0021] In Step (3), the second heating is preferably performed in an ultrahigh-temperature sterilizer. The final temperature for the second heating is preferably 85-90°C.

[0022] In Step (3), the second homogenizing is preferably performed in the high-pressure homogenizer. The pressure for the second homogenizing is preferably below 200MPa. The second homogenizing process is to raise the temperature of the materials to 85-95°C for better water-soluble mixing, which is good for breaking cell walls for the traditional Chinese medicine decoction at high temperature under high pressure to implement the water-soluble cross-linking of fat and essential oil, completely polymerizing the traditional Chinese medicine decoction and water molecules for ease in absorption by the human body.

[0023] In Step (4), the canned container is a conventional container in the art, preferably a plastic-aluminum-plastic composite packaging box or bag resistant to high temperature boiling, or a high barrier plastic container or a glass bottle. Moreover, the high barrier property is measured by the oxygen permeability of the material with the unit of $\text{cm}^3 (\text{cm}^2 \cdot 24\text{h} \cdot 0.1\text{mpa})^{-1}$, and the barrier property of the high-barrier aluminum-plastic composite material and the high-barrier plastic is within the range of 0.3-130.

[0024] In Step (4), the sterilizing at high temperature is preferably performed in a

high-temperature sterilization kettle, that is, the canned container is steamed and boiled at high temperature so that the traditional Chinese medicine decoction in the canned container is subjected to the mixing of water steam and materials. The temperature for the sterilizing at high temperature is preferably 115-125°C, more preferably 121°C, and the time for the sterilizing at high temperature is preferably 20-60min. After the sterilizing at high temperature, the high-temperature sterilization kettle is preferably subjected to a back-pressure cooling operation to cool the materials to room temperature. The pressure for the back-pressure cooling is preferably 0.2MPa-0.33MPa. The back-pressure cooling operation is preferably performed with compressed air. During the high-temperature sterilizing, the traditional Chinese medicine decoction is subjected to the polymerization of water-soluble fat, essential oil and water vapor at high temperature under high pressure once again, so that the fat-soluble traditional Chinese medicine decoction is more easily absorbed by the human body, with the body absorption rate increased to more than 90%. Through high-temperature sterilization, the storage life can reach 8-24 months based on normal-temperature storage in a freshness keeping condition.

[0025] Moreover, the normal temperature has the conventional meaning in the art, and is preferably 30°C.

[0026] The invention also provides a traditional Chinese medicine decoction prepared with the preparation method described above.

[0027] All the preferable conditions above can be randomly combined in compliance with the common knowledge in the art to implement all the preferred embodiments of the invention.

[0028] The reagents and raw materials used in the invention are commercially available.

[0029] The invention have the following positive effects:

[0030] (1) The freshness keeping method provided by the invention can preserve

the traditional Chinese medicine decoction for a long time, with the preservation time up to 24 months at room temperature.

[0031] (2) The technology of the invention makes the traditional Chinese medicine convenient to use and possible to preserve for a long time, and with the ultrafine-grinding water-soluble cell wall breaking technology, the fat-soluble traditional Chinese medicine decoction is easier to absorb by the human body, thereby increasing the pharmacological effect of the Chinese herbal medicine, with the absorption rate reaching 90% or above in the human body.

BRIEF DESCRIPTION OF THE SEVERAL VIEWS OF THE DRAWINGS

[0032] FIG. 1 is a graph showing the comparison of the hypoglycemic effects of oat milk, control group and positive drug on diabetic mice in Effect Embodiment 1.

[0033] FIG. 2 is a graph showing the comparison of the weight-reducing effects of oat milk, control group and positive drug on diabetic mice in Effect Embodiment 1.

[0034] FIG. 3 is a graph showing the comparison of the cholesterol-lowering effects of oat milk, control group and positive drug on diabetic mice in Effect Embodiment 1.

DETAILED DESCRIPTION OF THE INVENTION

[0035] The invention will be further illustrated below by way of embodiments, which are not intended to limit the invention. For the test methods without specific conditions indicated in the following embodiments, the specific conditions are selected according to the conventional methods and conditions, or according to the product instructions.

[0036] Embodiment 1

[0037] The preparation method of the traditional Chinese medicine decoction

provided by this embodiment comprises the following steps:

[0038] (1) the Chinese herbal medicine decoction consisting of Chinese herbal medicines and deionized water in parts by weight is prepared from 10 parts of Chinese herbal medicines and 90 parts of deionized water, where the Chinese herbal medicines and water are placed into a stewing pot and heated to 50°C, which is held for 2 hours for a soaking effect, and then the temperature of the cooking pot is raised to 95 °C to decoct with water for boiling 3 hours;

[0039] (2) the medicine decoction boiled at high temperature is naturally cooled to 80°C, and then the boiled Chinese herbal medicine dregs and water are all crushed and sheared into 150 meshes with a wet process; the Chinese medicine decoction from the first crushing and hearing is sheared at high speed into 400-500 meshes through wet-process ultrafine grinding, and is filtered through a 400-500-mesh stainless steel filter screen;

[0040] (3) after being filtered through the 400-500-mesh fine screen, the traditional Chinese medicine decoction is added to a pasteurizer and heated to 70-85°C, and then a 300Mpa high-pressure homogenizer is used to perform fat-soluble polymerization of the fat, essential oil and water for the water-soluble traditional Chinese medicine decoction, the Chinese medicine decoction is again heated to 90-95°C through an ultra-high-temperature sterilizer and then added to a 80MPa high-pressure homogenizer for homogenization, and the second high-pressure cell wall breaking of the water-soluble traditional Chinese medicine decoction allows the traditional Chinese medicine decoction to be completely polymerized with water molecules, fat and essential oil; and

[0041] (4) the decoction is filled to a container (an aluminum-plastic composite packaging box, bag or glass bottle and the like resistant to high temperature) at 85°C, and then the filled traditional Chinese medicine decoction is placed into the high-temperature sterilization kettle at the temperature of 121°C for high-temperature sterilization for 40 minutes, aiming to polymerizing the water-soluble fat, essential oil and water vapor of the

traditional Chinese medicine decoction at high temperature under high pressure again, then the high-temperature sterilization kettle is subjected to back-pressure cooling operation to cool the materials to 30°C, where the back-pressure cooling operation is performed under the back pressure of 0.2MPa-0.33Mpa with compressed air.

[0042] The preparation method in Embodiment 1 can make the fat-soluble traditional Chinese medicine decoction more easily absorbed by the human body, with the human absorption rate increased to 90% or above. Moreover, the traditional Chinese medicine decoction can be preserved fresh for a long time, with the storage life up to 24 months at normal temperature.

[0043] Effect Embodiment 1

[0044] A homologous wall-broken oat milk was prepared with the method of Embodiment 1, with whole germ oats and purified water as raw materials. This product can be stored at room temperature for 24 months without the addition of additives and preservatives, and ensure that the oat shells containing approximately 60% of nutrients can be effectively absorbed by the human body. The technology of the invention can ensure the integrity and efficacy of the nutrient release of oats; the boiling at 121°C for up to 3 hours is good for activating the telomerase activated protein and the active ingredients required by the human body, and fully releasing active ingredients such as β -glucan and linoleic acid. It is indicated that the method of the invention can magnify the efficacy of oats by 100 times and ensures the 100% absorption rate for the human body.

[0045] A report on the study of the effects of the wall-broken oat milk on the spontaneous diabetic mice is provided below:

[0046] Objective:

[0047] The db/db mouse is an internationally recognized animal model for Type 2 diabetes, obesity, and related metabolic diseases. This test is to study and evaluate the hypoglycemic, weight-reducing, blood lipid lowering, cholesterol lowering, insulin

secretion increasing effects of the oat milk on the db/db diabetic mice.

- [0048] Study Protocol
- [0049] 1. Test animal, test site, test materials, test instruments
- [0050] (1) Spontaneous diabetic mice
- [0051] Strain: db/dbC57BKS
- [0052] Animal Level: SPF level
- [0053] Animal Age: 6-7 weeks old
- [0054] Animal Weight Range: 36.0-44.0g
- [0055] Animal Origin: Model Animal Institute of Nanjing University
- [0056] Animal Certificate of Compliance No.: 00133359
- [0057] Animal Production License No.: SCXK(Su)2010-0001
- [0058] Issuance Unit of Animal Production License: Department of Science and Technology of Jiangsu Province
- [0059] (2) Test site
- [0060] SPF-level animal house from Shanghai Chempartner Co., Ltd., certified by the Association for Assessment and Accreditation of Laboratory Animal Care (AAALAC), with the Certification No. A5953-01
- [0061] (3) Test Materials/Reagents
- [0062] Oat milk (Lot No.: A2015/08/01)
- [0063] Positive drug: pioglitazone (Manufacturer: TCI (Shanghai) Development Co., Ltd.; Batch No.: QDI8K-FT)
- [0064] Dextroglucose (Manufacturer: JJ&K Chemical)
- [0065] Blood glucose test strips (Manufacturer: Roche Diagnostics GmbH from Germany; Lot No.: 474011)
- [0066] Glycated hemoglobin test strips (Manufacturer: Siemens; Batch No.: 0945055)

[0067] Insulin ELISA kit (Manufacturer: CRYSTAL, 90080; Batch No.: 13MAURI700)

[0068] (4) Test Instruments

[0069] Blood glucose tester (Model: ACCU-CHEK excellence blood glucose tester, Manufacturer: Roche Diagnostics GmbH from Germany)

[0070] Glycated hemoglobin tester (Model: Vantage, Manufacturer: Siemens)

[0071] Precision balance (Model: XS204, Manufacturer: METTLER TOLEDO)

[0072] ELIASA (Model: Spectra Max PLUS384, Manufacturer: Molecular Devices)

[0073] 2. Grouping and Dosing

[0074] (1) Control group (5 ml ml/kg) saline

[0075] (2) Oat milk group (5 ml/kg) oat milk

[0076] (3) Positive drug group (15 ml/kg) pioglitazone

[0077] 3. Test Steps

[0078] (1) The weight of each mouse was weighed and recorded at 9:00 AM on the test day, and blood was taken by puncturing the tail vein with a disposable syringe to measure blood sugar.

[0079] (2) By balancing the blood glucose and the weight, the mice were randomly divided into 3 groups.

[0080] (3) During the administration test, the physiological saline, oat milk or positive drug was administered intragastrically twice a day for 4 weeks. The following indicators were tested during the test:

[0081] A. Oral glucose tolerance test (OGTT): conducted at the 4th week after administration

[0082] B. Weight: measured once a week

[0083] C. Blood Sugar: measured once a week

[0084] D. Glycated Hemoglobin: measured before administration (0 week) and at the 4th week after administration

[0085] E. Plasma Insulin: measured at the 4th after administration

[0086] F. Lipid Metabolism Indicators: total cholesterol, high-density and low-density lipoprotein, and triglyceride. Measured at the 4th week after administration

[0087] 4. Results Handling and Data Analysis

[0088] Test results were analyzed using Prism and Excel Fit analysis software. The test results are indicated as mean $\pm$ standard deviation and statistically tested using the student-t test. Compared with the control group, a statistically significant difference is considered if the value of P is less than 0-0.5.

[0089] Research Test Results

[0090] (1) Hypoglycemic Effect

[0091] Compared with the control group, the oat milk group showed a significant decrease in the blood glucose of the diabetic mice from 26(mmol/l) (in the control group) to 20 (mmol/l) after 4-week administration, which was statistically significant. The glycated hemoglobin was somewhat reduced, and oral glucose tolerance was also improved accordingly, as shown in Table 1, Table 2, Table 3 and FIG. 1.

[0092] Table 1 Hypoglycemic effect in the control, oat milk and positive drug groups

Blood Sugar (mmol/L)	Control Group	Oat Milk Group	Positive Drug Group
Mean	26	20	18
Standard Deviation	1	2	2
t-test	1.000	0.015	0.002

[0093] Table 2 Test results of glycosylated hemoglobin in the control, oat milk and positive drug groups

Glycated Hemoglobin(%)	Control Group	Oat Milk Group	Positive Drug Group
Mean	7.5	6.9	6.8
Standard Deviation	0.2	0.5	0.5
t-test	1.000	0.256	0.183

[0094] Table 3 Test results of oral glucose tolerances in the control, oat milk and positive drug groups

Oral Glucose Tolerance AUC (mmol/L* min)	Control Group	Oat Milk Group	Positive Drug Group
Mean	2916	2802	2667
Standard Deviation	29	87	93
t-test	1.000	0.239	0.025

[0095] (2) Weight-reducing effect

[0096] Compared with the control group, the oat milk group began to show the weight-reducing effect at the 3rd week, which became more obvious at the 4th week of the test, with the weight decreased from 46 g (in the control group) to 37 g, showing a statistically significant difference. The weight in the positive drug group did not decrease, but increased slightly. See Table 4 and FIG. 2.

[0097] Table 4 Weight-reducing effect in the control, oat milk and positive drug groups

Weight (g)	Control Group	Oat Milk Group	Positive Drug Group
Mean	46	37	48
Standard Deviation	2	2	1

t-test	1.000	0.003	0.274
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[0098] (3) Cholesterol-lowering effect

[0099] Compared with the control group, the oat milk group showed a decrease in the total cholesterol in the diabetic mice after 4-week administration, which was statistically significant. There were no significant differences in the high-density and low-density lipoprotein levels, as shown in Table 5 and FIG. 3.

[00100] Table 5: Cholesterol-lowering effect in the control, oat milk and positive drug groups

Total Cholesterol (mmol/L)	Control Group	Oat Milk Group	Positive Drug Group
Mean	3.7	3.0	3.1
Standard Deviation	0.1	0.2	0.15
t-test	1.000	0.004	0.013

[00101] (4) Blood lipids lowering effect

[00102] Compared with the control group, the oat milk group showed no significant change in the level of triglyceride, as shown in Table 6.

[00103] Table 6 Test results on triglyceride in the control, oat milk and positive drug groups

Triglyceride (mmol/L)	Control Group	Oat Milk Group	Positive Drug Group
Mean	1.5	1.4	0.876
Standard Deviation	0.1	0.2	0.135
t-test	1.000	0.775	0.003

[00104] (5) Insulin secretion increasing effect

[00105] Compared with the control group, the oat milk group showed a slight increase in the insulin secretion in the diabetic mice after 4-week administration, which

was not statistically significant, as shown in Table 7.

[00106] Table 7 Test results on insulin in the control, oat milk and positive drug groups

Insulin (ng/mL)	Control Group	Oat Milk Group	Positive Drug Group
Mean	10.4	15.2	12.1
Standard Deviation	1.5	2.6	1.4
t-test	1.000	0.137	0.407

[00107] The results of this study show that the oat milk prepared according to the method of the invention has a significant hypoglycemic effect on the spontaneous diabetic db/db mice, with the mechanism acting by increasing the secretion of serum insulin. In addition, the oat milk showed a significant effect on reducing the weight of the diabetic obese mice, and a significant effect on lowering the total cholesterol in the mice, both of which are statistically significant.

[00108] Comparative Embodiment 1

[00109] In this comparative embodiment, the traditional Chinese medicine decoction obtained by the conventional method for decocting with water is studied, with the specific decoction method as follows:

[00110] Immersing the Chinese herbal medicines which were exactly the same as those in Embodiment 1 in water, soaking for 30 minutes, boiling on high heat, and simmering for 30 minutes on low heat; after cooling to room temperature, boiling for the second time and then simmering for 30 minutes; then cooling to room temperature, boiling for the third time, then simmering for 30 minutes, and filtering to obtain the decoction.

[00111] The absorption rate in the human intestinal tract of the traditional Chinese medicine decoction obtained in this embodiment was measured in the same manner as in Embodiment 1, and the results showed that the absorption rate was less than 5%.

[00112] Comparative Embodiment 2

[00113] In this comparative embodiment, the decoction and dregs obtained in Comparative Embodiment 1 were directly ground to 400-500 mesh, and then filtered to obtain the traditional Chinese medicine decoction.

[00114] The absorption rate of the traditional Chinese medicine decoction obtained in this comparative embodiment in the human intestinal tract was measured in the same manner as in Embodiment 1, and the results showed that the absorption rate was still less than 5% though the granularity of this traditional Chinese medicine decoction was as low as 400-500 mesh.

[00115] The invention is illustrated above by way of examples, but not limited to the particular embodiments described above. All the traditional Chinese medicine decoction, the concentrated traditional Chinese medicine decoction and the traditional Chinese medicine pills prepared by concentrating this traditional Chinese medicine decoction based on this method are construed to fall within the patent protection scope of the invention. Any changes or modifications are construed to be within the scope as claimed by the invention.

What is claimed is:

1. A preparation method of a traditional Chinese medicine decoction, characterized by comprising the following steps:

- (1) mixing Chinese herbal medicines and water, and decocting to obtain a mixture;
- (2) cooling the mixture, shearing and crushing twice, and then filtering with a 400-500-mesh sieve;
- (3) performing first heating on the decoction obtained from Step (2) to 70-85°C and then homogenizing, and performing second heating to 85-95°C and then performing second homogenizing; and
- (4) canning the decoction obtained from Step (3) at 80-90°C, and sterilizing at high temperature.

2. The preparation method of Claim 1, characterized in that in Step (1), a mass ratio of the Chinese herbal medicines to the water is (1-10):(10-90), wherein the water is deionized water.

3. The preparation method of Claim 1 or 2, characterized in that in Step (1), a device used for the decocting is a stainless steel cooking pot; and the decocting comprises the following substeps: heating to 40-60°C, soaking for 1-10 hours, heating to 90-100°C again, and boiling for 1-5 hours.

4. The preparation method of any one of Claims 1 to 3, characterized in that in Step (2), the cooling refers to cooling to 60-80°C; the shearing and crushing twice comprises first shearing and crushing and second wet-process ultrafine grinding; and a device for the filtering is a stainless steel filter screen.

5. The preparation method of Claim 4, characterized in that in Step (2), the first shearing and crushing is performed in a cutting-type wet-process ultrafine crusher; the second wet-process ultrafine grinding is performed in a wet-process ultrafine grinding mill; a mixture from the first shearing and crushing has the granularity of 100-200 meshes; and

a mixture from the second wet-process ultrafine grinding has the granularity of 400-500 meshes.

6. The preparation method of any one of Claims 1 to 5, characterized in that in Step (3), the first heating is performed in a pasteurizer; the homogenizing is performed in a high-pressure homogenizer; the second heating is performed in an ultrahigh-temperature sterilizer; and the second homogenizing is performed in a high-pressure homogenizer.

7. The preparation method of Claim 6, characterized in that in Step (3), the pressure for the homogenizing is below 60Mpa; the final temperature for the second heating is 85-90°C; and the pressure for the second homogenizing is below 200Mpa.

8. The preparation method of any one of Claims 1 to 7, characterized in that in Step (4), the sterilizing at high temperature is performed in a high-temperature sterilization kettle at the temperature of 115-125°C; and after the sterilizing at high temperature, the high-temperature sterilization kettle is subjected to a back-pressure cooling operation to cool the traditional Chinese medicine decoction to room temperature.

9. The preparation method of Claim 8, characterized in that in Step (4), the sterilizing at high temperature is performed at the temperature of 121°C for 20-60 minutes; and the back-pressure cooling operation is performed under the back pressure of 0.2-0.33Mpa with compressed air.

10. A traditional Chinese medicine decoction prepared with the preparation method of any one of Claims 1 to 9.