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FORMULATION AND EVALUATION OF HERBAL NUTRITIONAL TABLET FROM MORINGA OLEIFERA AND GINSENG

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ABSTRACT

To prepare a more comprehensive nutrition, more balanced proportion of natural nutritional supplement tablets with Moringa oleifera leaves and ginseng the two nutrients which have complementary natural food ingredients. Method: On the basis of research M. oleifera leaves with ginseng nutrient composition was determined on M. oleifera leaves and ginseng ratio of raw materials, and the choice of microcrystalline cellulose, sodium salt of caboxy methyl cellulose (CMC), magnesium stearate excipient, through single factor and orthogonal experiment, selecting the best formula tablets prepared by powder direct compression technology, for preparationof M. oleifera and ginseng tablets. Results: The best ratio of raw material for the M. oleifera leaves powder: ginseng powder was 7:3, the best raw materials for the tablet formulation was 88.5%, 8.0% microcrystalline cellulose, CMC 2.0%, stearin magnesium 1.5%, the optimum parameters for the raw material crushing 200–300 mesh particle size, moisture content of 7%, tableting pressure 40 kN. Conclusion: Through formulation and process optimization, we can prepare more comprehensive and balanced nutrition M. oleifera and ginseng tablets, its sheet-shaped appearance, piece weight variation, hardness, friability, disintegration and other indicators have reached the appropriate quality requirements.

KEYWORDS: Moringa oleifera, Ginseng, Nutrition tablets, Formula, Process optimization.

INTRODUCTION

Nutrition of Moringa and Ginseng Powder

Moringa oleifera is loved for its mix of vitamins, minerals, and other substances that are good for your health.

Nutrient Composition: Moringa leaves, which are used to make moringa powder, are packed with needed nutrients.

Vitamins and Minerals: These leaves offer vitamins A, B complex & C, as well as calcium, iron, magnesium, and potassium.

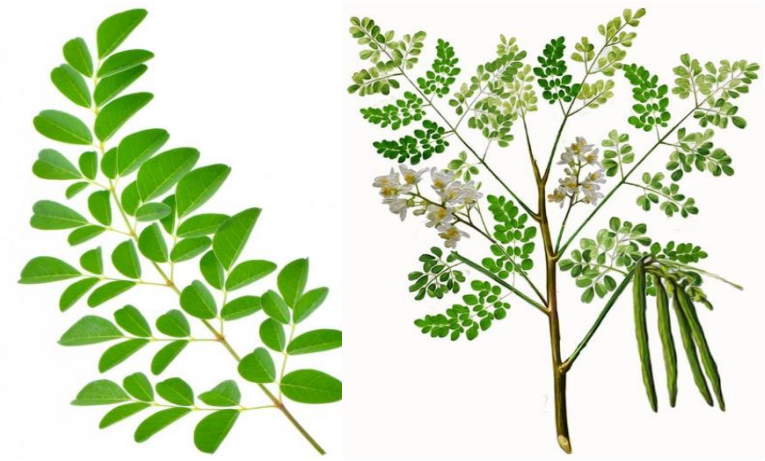
Amino Acids: They also provide all nine amino acids needed by the body. Amino acids play a crucial role in your body's growth and upkeep.

Antioxidants: Moringa shines for its high levels of antioxidants. These substances, like quercetin, chlorogenic acid, and beta-carotene, are proposed to ward off damage to your body cells.

Moringa oleifera

The medicinal plants were specified for being natural resources of the compounds with nutritional and pharmacological possibilities which will aid humans in preventing and treating certain diseases. From many plants assessed in the bio prospective researches, the M. oleifera, which is commonly indicated as "quiabo-de-quina", "lírio branco", or "moringa", in certain world's regions, as horseradish tree or drumstick tree, were effective as alternate medical therapies, with efficiency in controlling a lot of illnesses. Also, their medicinal potential comes from the secondary metabolites, including resins, coumarins, flavonoids, alkaloids, steroids, tannins, saponins, and quinones. Seeds, flowers, leaves, and pods of the discussed tree have been specified as one of the food sources with great nutritional values in Africa and other nations, especially in Pakistan, Philippines, and India. One might consume the plant's leaves fresh or cooked, and they might store them as dried powder which has been un-refrigerated without losing nutrition's, for many months. Certainly, the M. oleifera has been adding considerable benefits of health to nations in which the hunger has been an issue. Furthermore, the M. oleifera is an excellent plant with a lot of medicinal applications. It is indicated as 'Miracle Tree' or 'The Tree of Life' due to its versatility and economic significance M. oleifera as shown in Its medicinal potential derives from secondary metabolites in addition to the essential amino acids including lysine,

tryptophan, methionine, vitamins, also mineral salts are existing in elevated quantities in leaves of the plant. Earlier researches indicated the possible therapeutic abilities regarding the M. oleifera, like anti-microbial, anti-cancer, anti-inflammatory, and anti-oxidant characteristics, anti-atherosclerotic. Furthermore, the thyroid regulation impacts, also protecting against the oxidative damages. A lot of epidemiological and experimental evidences suggesting that the plant have anti-oxidant impacts against the massive damage related to the oxidative stress. Anti-oxidants existing in the plant's leaves, act in in cooperation with anti-oxidant system exists in a body. A lot of researches are focusing on evaluating a lot of detoxication as well as anti-oxidant enzymes due to the treatment by M. oleifera or with the phytochemicals that is isolated from M. oleifera.



Ginseng

The medicinal use of plants is an ancient tradition, far older than the contemporary sciences of medicine, pharmacology, and chemistry. The world health organization has estimated that over 75% of the world's population still relies on plant derived medicines, usually obtained from traditional healers, for its basic health care needs. Herbal medicines are in great demand in the developed as well as developing countries for primary healthcare because of their wide biological and medicinal activities, higher safety margins and lesser costs. Panax ginseng belongs to the Araliaceae family Panax is derived from the Latin word panacea, which refers to its historical usage for many conditions. Panax ginseng, used medicinally for thousands of years in China, Korea, and Japan,[4] is well known as an adaptogen and a restorative tonic that is widely used in traditional Chinese medicine (TCM) and Western herbal preparations.[5,6] Eclectic uses for Panax ginseninclude infertility, liver disease, amnesia, colds, menopause, and erectile dysfunction.

Moringa and ginseng are extremely rich in nutritional values, and have certain health values of natural biological resources; our study found that the nutritional composition is complementary; if the moringa and ginseng are mixed by a certain scale to prepare a kind of complex tablets, their nutritional species are more comprehensive, with more balanced proportion of nutrients. At the same time based on environmental restrictions and climatic conditions, quality ginseng production is limited with higher prices, and moringa is adaptable in tropical and subtropical areas, with high biomass production, and the price is relatively low. By preparing complex nutritional tablets of M. oleifera and ginseng, the cost is relatively low and easy to promote, as these two high-value biological resources are better for human health services.

Moringa oleifera is a nutrient-dense plant packed with vitamins, minerals, antioxidants, and amino acids.

The plant has potential health benefits in reducing inflammation, improving digestion, and supporting cardiovascular health.

Moringa powder may help manage diabetes, protect the liver, and strengthen the immune system.

Some research suggests that moringa may have properties that combat cancer and protect against arsenic toxicity.

It is important to consult a healthcare provider before using moringa supplements, as potential side effects and risks may exist for specific populations.

Introduction

Moringa oleifera, often called the drumstick tree or miracle tree, grows fast and handles dry conditions well. This plant, originally from India, has gained a lot of buzz for its potential health perks and rich set of nutrients. It has even been used in traditional medicine for many years.

In this post, we'll dig into what nutrition moringa powder packs. We'll also explore what science says about the health upside of this supplement and the possible side effects. By the end, you'll have the full picture of moringa usage So, let's get started.

MATERIAL AND METHODS

Materials

Biological materials M. oleifera Lam. PKM-1: its fresh leaves are collected in characteristic biological resources engineering technology center planting base in dry-hot valley from Panzhihua city. Ginseng platensis: produced in Chenghai lake of Lijiang in Yunnan.

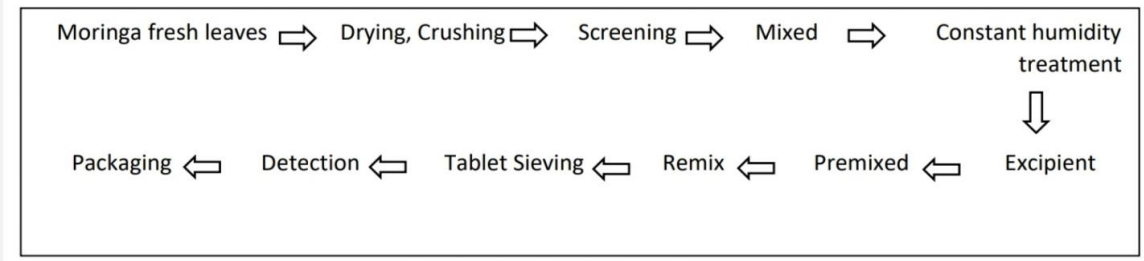
The main instruments and reagents Main instruments: constant temperature drying ovens, ultrafine grinding instrument, vibration screening machines, mixers, constant temperature and humidity chamber, electronic scales tablet hardness measuring instrument, friability tester, intelligent disintegration tester and rotary tablet machines. Reagents: microcrystalline cellulose (food grade), magnesium stearate (food grade), sodium carboxymethyl cellulose (food grade).

Methods

Production process The Production process of M. oleifera and ginseng complex nutritional tablets.

Process operation points

1. After collecting Moringa fresh leaves, remove yellow leaves, rotten leaves, cut long petioles and place the leaf in 60 C oven to dry for 8-12 h spare.
2. Moringa dried leaves and ginseng should be crushed alone, make use of vibration screening machine for screening to get different sizes of raw materials, then mix according to the proportion.
3. Excipient has less ratio, in order to ensure uniform mixing, first take 15-20% of the raw materials to pre- mix with excipients for 5 min; After pre-mixing, place the remaining raw material mixture for 5 min after two- 45 timing mixed processing, uniformity of the sample can be ensured.



Tablet is punched by using following formulas: Each tablet of 250 mg.

Ingredient	F1	F2	F3	F4
Moringa Oleifera	176 mg	176 mg	176 mg	176 mg
Ginseng	5mg	5mg	5mg	5mg
Gelatin	1.50 mg	8.74 mg	-	-
PVP (Polyvinyl Phosphate)	-	-	1.76 mg	5.50 mg
Starch	18.26 mg	18.26 mg	22.65 mg	18.26 mg
Lactose	45.28 mg	38.05 mg	40.60 mg	41.10 mg
Sodium lauryl sulfate	1.25 mg	1.25 mg	1.25 mg	1.25 mg
Talc	0.25 mg	0.25 mg	0.25 mg	0.25 mg
Magnesium stearate	2.5 mg	2.5 mg	2.5 mg	2.5 mg
Total	250 mg	250 mg	250 mg	250 mg

PRECOMPRESSION STUDY

A. Flow
B. Bulk Density
C. Tap Density-
D. D. Hausners Ratio-

A. Flow Property of Powder

1. For F1

Tan Θ = Height / Radius

$\Theta = \tan^{-1} 1.45/2.5$

$\Theta = 30^0 16'$

2. For F2

Tan Θ = Height / Radius

$\Theta = \tan^{-1} 1.40/2.30$

$\Theta = 30^0 96'$

3. For F3

Tan Θ = Height / Radius

Θ = tan -1 1.30/2.50

$\Theta = 27^0 47'$

4. For F4

Tan Θ = Height / Radius
Θ = $\tan^{-1}$ 1.30/2.55
Θ = $26^0$56'

Higher the angle of repose lower the flow rate hence here F3 & F4 have low angle of repose and greater flow rate.

B. Bulk Density

For F1,
Bulk Density = Mass/volume
= 10 gm/15ml
= 0.66 gm/ml

For F2,
Bulk Density = Mass/volume
= 10 gm / 14.90 ml
= 0.67 gm/ml

For F3,
Bulk Density = Mass/volume
= 10 gm / 15.20 ml
= 0.65 gm/ml

For F4,
Bulk Density = Mass/volume
= 10 gm /15 ml
= 0.66 gm/ml

C. Tap Density

For F1,
Tap Density = Mass/Tapped volume
= 10 gm/ 9ml
= 1.11 gm/ml.

For F2,
Tap Density = Mass/Tapped volume
= 10 gm/ 9.4 ml
= 1.06 gm/ml

For F3,
Tap Density = Mass/Tapped volume
= 10 gm / 9.2 ml
= 1.08 gm/ml

For F4,
Tap Density = Mass/Tapped volume
= 10 gm / 8.9 ml
= 1.12 gm / ml

D. Hausners Ratio

For F1,
Hausners Ratio = Tap Density/ Bulk Density
= 1.11/0.66
= 1.68

For F2,
Hausners Ratio = Tap Density/ Bulk Density
= 1.06/0.67
= 1.58

For F3,
Hausners Ratio = Tap Density/ Bulk Density
= 1.08 / 0.65
= 1.66

For F4,
Hausners Ratio = Tap Density/ Bulk Density
= 1.12 /0.66
= 1.69

Evaluation parameters

I. Organoleptic evaluation –
a. Colour – Greenish in colour
b. Odour – woody-floral
c. Taste - Bitter

II. Physiochemical Evaluation

a. Uniformity of weight -
b. Hardness -
c. Dissolution test –

For F1

Tablet	1	2	3	4	5	6	7	8	9	10	Average
Weight (Mg)	248	250	252	250	250	248	247	253	248	248	249.4

For F2

Tablet	1	2	3	4	5	6	7	8	9	10	Average
Weight (Mg)	248	247	253	248	248	248	250	252	250	250	249.5

For F3

Tablet	1	2	3	4	5	6	7	8	9	10	Average
Weight (Mg)	250	248	253	249	247	248	250	252	250	250	249.7

For F4

Tablet	1	2	3	4	5	6	7	8	9	10	Average
Weight (Mg)	249	249	250	248	246	248	250	252	252	251	249.5

B. Hardness –

For F1

Tablet	1	2	3	4	5	6	7	8	9	10	Average
Hardness (Kg)	4.9	4.9	5.0	4.8	4.6	4.8	5.0	5.2	5.2	5.1	4.95

For F2

Tablet	1	2	3	4	5	6	7	8	9	10	Average
Hardness (Kg)	5.0	4.8	5.3	4.9	4.8	5.2	5.0	5.2	5.0	5.0	5.02

For F3

Tablet	1	2	3	4	5	6	7	8	9	10	Average
Hardness (Kg)	4.8	5.0	5.2	5.0	5.0	4.8	4.9	5.3	4.8	4.8	4.96

For F4

Tablet	1	2	3	4	5	6	7	8	9	10	Average
Hardness (Kg)	4.8	4.9	5.3	4.8	4.8	4.8	5.0	5.2	5.0	5.0	4.90

Dissolution test – (By using *vebbo* tablet dissolution apparatus)

For F1

The dissolution testing employed standardized procedures to evaluate the release of bioactive compounds from Moringa oleifera and ginseng herbal tablets (designated as F1). A phosphate buffer with a pH of 6.8 mimicked the small intestine environment. Tablets were placed in a basket apparatus, maintained at 37°C, and rotated at 50 rpm for optimal mixing. The tablets took 6 hours for complete dissolution.

For F2

The dissolution testing employed standardized procedures to evaluate the release of bioactive

compounds from Moringa oleifera and ginseng herbal tablets (designated as F2). A phosphate buffer with a pH of 6.8 mimicked the small intestine environment. Tablets were placed in a basket apparatus, maintained at 37°C, and rotated at 50 rpm for optimal mixing. The tablets took 6.5 hours for complete dissolution.

For F3

The dissolution testing employed standardized procedures to evaluate the release of bioactive compounds from Moringa oleifera and ginseng herbal tablets (designated as F3). A phosphate buffer with a pH of 6.8 mimicked the small intestine environment. The tablets were placed in a basket apparatus, maintained at 37°C, and rotated at 50 rpm for optimal mixing. The tablets took 8 hours for complete dissolution.

For F4

The dissolution testing employed standardized procedures to evaluate the release of bioactive compounds from Moringa oleifera and ginseng herbal tablets (designated as F4). A phosphate buffer with a pH of 6.8 mimicked the small intestine environment. The tablets were placed in a basket apparatus, maintained at 37°C, and rotated at 50 rpm for optimal mixing. The tablets took 7 hours for complete dissolution.

Evaluation index of M. oleifera and ginseng complex nutritional tablets

Establishing evaluation criteria Referring Pharmacopoeia (2010 edition) (State, 2010) and other relevant information, the article established M. oleifera and ginseng complex nutritional tablet evaluation index in terms of sheet-shaped appearance, piece weight variation, hardness, friability, disintegration time and other aspects."

Evaluation method

Sheet-shaped appearance. Take twenty samples on a clean white porcelain vessel, in diffuse daylight or artificial light like daylight, visual study its color and luster as well as state. Tablet weight difference. Take 20 samples. Accurately weighed on the total weight, obtain average piece weight, then weigh and the weight of each piece precisely; compare each slice weight and the average tablet weight per piece, then calculate the relative average deviation, 56.7.

Hardness. Take 20 samples, measure hardness with hardness measuring instrument and achieve average value.

Friability. Take 20 samples, use a hair dryer to blow off the powder, precisely weighing, set friability tester in cylinder and rotate 100 times. Take out, remove the powder with the same method, precisely weighing, statistics and analysis.

Disintegration time. Take 20 samples and put into the smart disintegration instrument to observe and obtain disintegration and calculate the average of disintegration time.

Formulation of M. oleifera and ginseng complex nutritional tablets

Raw material ratio between Moringa leaf powder and ginseng powder There are many reports on the nutrients of Moringa leaves and ginseng (Guoliang and Yin, 2012), the main nutrients, according to the required daily nutrition standards proposed by International Union of Nutritional Sciences body in 2011, these indicators of human's required daily intake amount through in-depth analysis and statistical calculation, the best raw material ratio of Moringa leaf powder and ginseng powder is received.

Selection of excipients the excipient is prepared as auxiliary raw material in addition to the main drug in tablets. The excipients have many kinds of species, having binders, lubricants, diluents, disintegrating agents, and wetting agents. One can accord the different characteristics of raw materials and processing tablets to choose different accessories. In this study, the main choices are binder, disintegrator, and lubricant to increase the pressure and flow of materials and disintegration of the tablets. Use as evaluation criteria, on the basis of a lot of information (Shenghui et al., 2014), first select the sodium carboxymethyl cellulose (0.5%, 1%, 1.5%, 2%, 2.5%), microcrystalline cellulose (2%, 4%, 6%, 8%, 10%) and magnesium stearate (0.5%, 1%, 1.5%, 2%, 2.5%) to do a single factor test.

Optimization of formulas on the basis of examining single factors of excipients, design orthogonal optimization test and score according to Table 1 to determine the optimal formula composition using range Analysis.

Production process optimization of M. oleifera and ginseng complex nutritional tablets

By direct powder compression process, the raw material powder size directly affects the quality of the tablet. If powder particle size is large, tablets are prone to appear lobes, piebald, excessive hardness. With the powder particle size decreases, the passing rate of the tablet increase, but when size is too small, it's easy to agglomerate when mixing to impact mixing effect for the high sticking probability when tableting. Experimental selected powder sizes are 40-80, 80-120, 120-200, 200-300, 300-500 for single factor experiment. Water content of the raw material powder also directly affects the quality of tableting. When water is too high, the material flow is poor, and easy to breed microbes, mildew, shortening shelf life; when the moisture is too little, tableting is easy.

To be loose and incomplete, and the hardness can't meet the requirement, and tablet pass rate is significantly reduced. Use M. oleifera and Ginseng powder moisture content (4%, 6%, 8%, 10%, 12%) to do tableting single

factor test, the water content of raw materials is controlled by using humidity chamber with a relative humidity adjusted and the drying time. Production pressure is vital for the molding and qualities of the tablets, and the experiment gradually increases the production of pressure (15, 20, 30, 40 kN), to examine the effect of tableting. On the basis of the single-factor experiments, combined with previous recipe optimization findings, the study designed orthogonal optimization test and scored, using range analysis to determine the optimum process parameters.

Experimental result from formulation optimization

Single-factor test results show that the optimum amount of microcrystalline cellulose is 8%; optimum amount of sodium carboxymethyl cellulose is 2%; the optimum amount of magnesium stearate is 1.5%; in accordance with orthogonal table L9 (34) orthogonal experimental design Formula of M. oleifera and ginseng complex nutritional tablets orthogonal test results and data analysis. The order of factors affecting the product quality is M. oleifera and ginseng powder > magnesium stearate > microcrystalline cellulose > sodium carboxymethyl cellulose. The best formula combination is A2B2C2D2. With this formula combination the study made three times parallel test, the average product composite score is 89.2, indicating that the combination is the best recipe combinations. The percentage content of each component is: M. oleifera and ginseng powder: microcrystalline cellulose: sodium carboxymethyl cellulose: Magnesium stearate is 88.5:8:2:1.5, which means that the prepared 100 g tablet contains moringa powder 61.95 g and ginseng powder is 26.55 g.

M. oleifera and ginseng production process optimization results complex nutrition tablets Single factor experiment results showed that the raw material powder particle size is 200-300 mesh, material moisture content is 8%, tableting pressure should be 30 kN, as a reference in accordance with orthogonal table 1.9 (33) of orthogonal optimization tests.

Direct optimization of Moringa and ginseng powder complex nutritional tablets which prepared orthogonal test results and data analysis. The order of factors on the sensory quality is: moisture > tableting pressure > powder particle size, the best formula combination is A2B1C3, namely raw material particle size is 200-300 mesh; material moisture content is 7%, and tableting pressure is 40 kN. With this formula combination three times parallel test are conducted, and the average composite score is 96.2, indicating that the combination is the best process parameter 29.10.11

RESULTS

Formulating research results of M. oleifera and ginseng complex nutritional tablets. The best ratio of raw materials-According to literature reports, use the tablets of moringa or ginseng whose nutrients are not very complete, or some nutrition indicators are low, which cannot fully meet the requirements of balanced diet; through analysis, Nutritional ingredients of moringa and ginseng are highly complementary, producing composite tablet, which have more complete nutrition indicators. The content can meet or be near the range of needs. Through a comprehensive analysis of each index, we can determine the ratio of Moringa leaf powder and ginseng powder as 7:3. Nutrient composition ratio produced in the complex tablet is the most reasonable, while cost of preparation is relatively low.

CONCLUSION AND DISCUSSION

The results showed that through the optimization formula one can use the mixed raw materials of moringa leaves and ginseng to produce Moringa and ginseng powder complex nutritional tablets using direct powder compression process, in which the ratio of Moringa leaf powder and ginseng powder is 7:3, and the type and content of nutrients are the most balanced. By sheet-shaped appearance, tablet weight difference, hardness, friability, disintegration time five aspects as the evaluation criteria, and microcrystalline cellulose, sodium carboxymethyl cellulose and magnesium stearate as excipients. By single factor text and orthogonal experiment, the ratio of raw materials is 88.5% (of which Moringa leaf powder is 61.95%, ginseng powder is 26.55%), microcrystalline cellulose content is 8%, and sodium carboxymethyl cellulose is 2%, while magnesium stearic content is 1.5%, achieving the most ideal tablet preparation. The study examined the influence on raw material particle size, moisture content of raw materials and the impact of tableting pressures, and the conclusion is that the best raw material particle size is 200-300 mesh, the best raw material moisture content is 7%, with the best Tableting pressure 40 kN. The color of Moringa and ginseng complex nutritional tablets is green, bluish, complete and smooth, uniform color, no clutter, no foreign matter, tablet weight difference is less than 5%, and friability is less than 1 percent, hardness is above 40 N, and the average disintegration time is 7.2 min, tablet pass rate is 96 percent. The study provides a scientific basis for the mass production of Moringa and ginseng complex nutritional tablets.

The produced Moringa and ginseng complex nutritional tablets are recommended to take 6-8 g a day, better than the single use effect on ginseng tablets or moringa sheet, which can help most people improve a more balanced nutrient intake and human health. When Moringa leaf powder and ginseng leaf powder has the ratio of 7:3, it's mainly for group for adults aged at 18-55, the nutritional needs between the elders and minors may be Inconsistent, and therefore you can adjust the recipe proportions for different groups during processing.

Using direct powder compression to prepare tablets has less nutrient loss, because the raw materials don't go Through heat treatment, but there may be existing losses. The actual losses still need further texting on the

nutritional content of products, while the condition of products health and safety indicators and stability situation has yet to be carried out in the next disease.

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