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ORIGINAL ARTICLE

Optimization of formulation and processing of *Moringa oleifera* and spirulina complex tablets



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Formula;
Process optimization

Abstract *Objective:* To prepare a more comprehensive nutrition, more balanced proportion of natural nutritional supplement tablets with *Moringa oleifera* leaves and spirulina the two nutrients which have complementary natural food ingredients. *Method:* On the basis of research *M. oleifera* leaves with spirulina nutrient composition was determined on *M. oleifera* leaves and spirulina 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 preparation of *M. oleifera* and spirulina complex tablets. *Results:* The best ratio of raw material for the *M. oleifera* leaves powder: spirulina 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 spirulina complex tablets, its sheet-shaped appearance, piece weight variation, hardness, friability, disintegration and other indicators have reached the appropriate quality requirements.

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1. Introduction

Moringa oleifera, Capparales moringa plant, native to India, also known as drumstick tree, is a perennial tropical deciduous tree. The seeds and leaves of these have rich nutrients; protein content of leaves reached 27%; minerals and vitamins contain many kinds and high content of nutrients, which is considered as one of the plants with the richest nutritional ingredient humans ever found (Liu and Li, 2002). Moringa is called a kind of magical healthy plant, which is rich in nutrients, and

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also contains Moringa polysaccharides, flavonoids, γ -amino butyric acid and other active ingredients, with good therapeutic care function; so it is known as the Magic Tree and Tree of Life.

Spirulina, class of prokaryotic microorganisms, cyanobacteria Oscillatoria algae division, is one of the oldest creatures on earth, is found on Earth the most balanced nutrition, the most abundant natural food. World Health Organization and the United Nations FAO recommended Spirulina as the twenty-first century best food and best of human health products (Huijuan and Guihua, 2005). Spirulina features nutrients is high in protein, low fat, low cholesterol, but also contains more γ -linolenic acid, vitamins, minerals and trace elements, and for the human body is very useful. Meanwhile phyco-cyanin, algae contain polysaccharides and other biologically active substances, and can improve immunity, has anti-cancer, effects.

Moringa and spirulina 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 spirulina 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 spirulina 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 spirulina, the cost is relatively low and easy to promote, as these two high-value biological resources are better for human health services.

2. Material and methods

2.1. Materials

2.1.1. 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.

Spirulina platensis: produced in Chenghai lake of Lijiang in Yunnan.

2.1.2. The main instruments and reagents

Main instruments: constant temperature drying ovens, ultra-fine 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) and so on (Changfen and Guohua, 2004).

2.2. Methods

2.2.1. Production process

The Production process of *M. oleifera* and spirulina complex nutritional tablets is shown as Fig. 1.

2.2.2. 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 spirulina 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 time mixed processing, uniformity of the sample can be ensured.

2.2.3. Evaluation index of *M. oleifera* and spirulina complex nutritional tablets

(1) Establishing evaluation criteria

Referring Pharmacopoeia (2010 edition) (State, 2010) and other relevant information, the article established *M. oleifera* and spirulina complex nutritional tablet evaluation index in terms of sheet-shaped appearance, piece weight variation, hardness, friability, disintegration time and other aspects (see Table 1).

(2) Evaluation method

- Sheet-shaped appearance. Take 20 samples on a clean white porcelain vessel, in diffuse daylight or artificial light similar to 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.

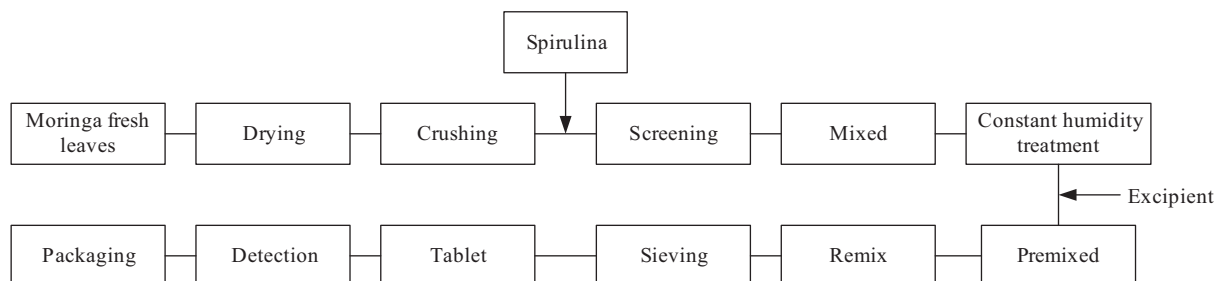


Figure 1 The production process of *Moringa oleifera* and spirulina complex nutritional tablets.

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