

INCREASING THE EXTRACTION COEFFICIENT BY MAKING THE APPROPRIATE CHOICE OF SOLVENT CONCENTRATION DURING THE EXTRACTION OF PANAX GINSENG

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Abstract

Panax Ginseng is a pharmaceutical plant that has been known since ancient times and has been used as an additional tincture of other products in the food industry, without much knowledge about the healing abilities of this plant, therefore there is a lack of scientific and clinical research on the extracts of this plant, therefore at the present time there is also a lack of concrete data on the adequate methods of obtaining this extract. At the beginning of the 21st century, the first research for use in pharmaceuticals began by producing extracts from the roots of this plant, but without knowing its carrier components and accompanying components well. Ginseng extract is obtained by maceration extraction, where ethyl alcohol with a certain concentration is used as a solvent. It is very important to emphasize that the isolation of Ginseng carrier materials is not that easy, since an adequate solvent must be chosen during extraction, as well as an adequate temperature for extraction, and at the same time, a definition must be made. and the time required for extraction. The maceration extraction method has its advantages over other extraction methods as it has a higher extraction coefficient.

Key words: Maceration, extraction coefficient, extraction

Introduction

Ginseng is a plant belonging to the Panax family and is mainly grown in the mountainous regions of Asia and North America. The most popular species are Asian Ginseng (*Panax ginseng*) and American Ginseng (*Panax quinquefolius*), which is milder. The root of the plant, which has been used for centuries in traditional Chinese medicine, is known for its generative and health-promoting effects. The name "Panax" is derived from the Greek word "panacea", meaning "medicine" or "cure for all diseases", reflecting the wide range of applications of Ginseng (T. K. Yun, 2009). The effects of Ginseng are diverse and are mainly attributed to its active ingredients, the Ginsenosides. These compounds are believed to have modulatory effects on the immune system and the central nervous system. Ginseng is said to enhance physical and mental performance, combat fatigue, reduce stress, promote sexual health, lower blood sugar levels, and improve immune function (I.-H. Baeg und S.-H. So) Through their adaptogenic properties, ginsenosides help the body better cope with mental and physical stress. They support metabolic stability, regulate important hormones such as cortisol and testosterone, and protect cells from damage caused by oxidative stress. As a result, they increase endurance, improve performance under stress, and reduce the risk of stress-related diseases. (F. Scaglione, F. Ferrara, S. Dugnani, M. Falchi, G. Santoro, und F. Fraschini,) Ginseng has been shown to help lower and regulate high blood sugar levels. Thanks to its numerous antidiabetic effects, this medicinal plant is often used

as an additional therapy for type 1 diabetes. Cultivating this forest plant requires a lot of patience. Ginseng grows in the shade, needs proper irrigation, and takes six years to mature before the active ingredients, known as ginsenosides, are present in sufficient concentration (G. N. Predy, V. Goel, R. Lovlin, A. Donner, L. Stitt, and T. K. Basu.) Ginseng root is harvested in the fall after the aboveground parts of the plant have dried. Ginseng roots of the *Panax* species are a product that has been used since ancient times in China and Korea without knowing its healing abilities since clinical studies on this product were lacking, therefore it has only been used in the food industry in the form of tincture or consumed as a product that was thought to increase the immunity of patients, primarily against colds and chronic diseases (Kim S (2007). Ginseng comes in two colors, the white one, while after washing it, red pigments are created, which after a while also turns the Ginseng roots red. In principle, there is no change in the carrier substances found in the Ginseng roots, but only the surface color changes. The carrier substances of Ginseng are Ginsenosides and Gintonin (Baeg IH, So SH (2013) In ancient times, Ginseng was harvested in the mountains at high altitudes, known as wild Ginseng, such as in China, Korea, the southern parts of Russia and the mountains of Vietnam. The recent high demand for this plant, with numerous research and various clinical studies, has led to the cultivation of this plant, which has yielded much better results by cloning it and isolating the necessary carrier materials and removing the useless carrier materials in it. (Taylor DA). Rapid growth in Ginseng production began in the 1990s with a capacity of about 80,000 tons, with about 70% of production being in China, Korea, Canada and America. In small quantities, Ginseng extract is used as an additive in energy drinks and in the food industry. In the food industry, it is usually used as a thinly sliced or even whole. (Oktay S, Ekinci EK (2019). Ginseng is attributed to a positive effect on the skin against premature skin aging caused by light, wrinkle formation and melanogenesis [The main active substances are also ginsenosides, which can achieve an "anti-aging effect" due to their anti-wrinkle and skin-lightening properties. (L. You and J. Y. Cho). The potential applications are wide-ranging. It has been proven that *Panax ginseng* subtly lowers blood glucose levels and can therefore potentiate the effect of conventional oral antidiabetic drugs, although this has not yet been confirmed in any study. A study with ginseng in non-insulin-dependent diabetes showed a psychological improvement, an improvement in psychophysical performance, a decrease in fasting blood glucose and a decrease in body weight. In addition, an improvement in HbA1c levels was found. (E. A. Sotaniemi, E. Haapakoski, and A. Rautio) Recently, a study from Korea showed that the risk of developing cancer can be significantly reduced by taking Ginseng There is a theory, which is not yet fully proven, that this plant reduces cancer by taking Ginseng. If cancer has already appeared, Ginseng alleviates side effects such as fatigue during cancer therapy. It also improves the chances of successful treatment. Some studies have shown that Ginseng can alleviate or prevent mucositis that develops during cancer therapy. (J. W. Chang, K. H. Park, H. S. HWANG, Y. S. Shin, Y.-T. Oh, and C.-H. Kim). In a study from Sweden, 384 menopausal women randomly selected took either a placebo or Ginseng extract for 16 weeks and an overall improvement in symptoms was observed. However, no effect was found on hormone-related symptoms, such as hot flashes, estrogen levels, etc., thus excluding the possibility that the effect of Ginseng was due to hormonal changes (I. K. Wiklund, L. A. Mattsson, R. Lindgren, and C. Limoni)

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Ginseng roots after harvesting as such are accompanied by impurities from the soil where they grew, so it is required that they be subjected to washing which is carried out in a tub of water, the

roots are immersed for about an hour and after cleaning a shine can be observed on their skin. After washing, due to the high amount of moisture which is above 15% moisture, the Ginseng roots are subjected to drying. Drying is done in a drying oven at a temperature of 105°C for one hour. It is observed that after drying the roots become brittle and break easily and take on a slightly reddish color. After drying, 300 grams of dried roots were taken and subjected to grinding in a Retsch 5000 mill with a 1 mm sieve mounted. 50 grams of the ground raw material were weighed and analyzed. of the sieves in a period of 10 min and a diagram of the sieve analysis Table 1 Figure 1 has been made. It is most important to use a 1mm or larger sieve during grinding due to the fragility of the raw material which does not pass through the extraction holes. The use of finer sieves creates a very fine material, even to a degree in the form of powder which is not suitable for extraction. From the results of the sieve analysis, the appropriate extraction method was also chosen, the maceration extraction method. In a 2000 ml chemical beaker which is placed in a temperature-controlled oven of 50°C, 100 g of ground Ginseng were weighed and 1200 ml of 50% ethyl ethanol were added. A mixer was placed where 180 rpm was set and from this moment the extraction process began in a period of 60 min. During the extraction for different times, a sample was taken from the beginning of the extraction to the end of the process. All the samples taken were subjected to filtration with a 0.2 Micron filter and the dry mass was measured for different extraction times and in this way the extraction curve was also constituted. Table 2 Figure 2. The extract obtained has a yellow color which has a special shine. What makes this process difficult is the filtration which is not so easy to perform and requires more time. The reason for this is because the first filtered material contains a high part of the extremely fine mass which fills the pores of the filter and makes it difficult. Also for the second analysis, a 2000 ml chemical beaker was placed in a temperature-controlled oven at 50°C, 100 g of ground Ginseng were weighed and added. 1200 ml Ethanol 75%. The mixer is set to 180 rpm and the extraction process begins here. The extraction lasts 60 min. For different extraction times, a sample was taken which was subjected to the filtration process with a 0.2 micro filter and the dry mass was measured in order to constitute the extraction curve. Table 2 Figure 2. The extract obtained from the second analysis after filtration also has a yellow color and metallic luster. It can be concluded that the filtration process is carried out without obstacles as a result of the lower density of the 75% Ethanol solvent, which also makes the process feasible without technical obstacles. The extracts obtained from those two analyses are subjected to the evaporation process using a Rotavapor 113 to a dry mass of 45%. This obtained extract is allowed to stand in a chemical beaker for 24 hours until the second phase is created in the form of a bottom, which is discarded and the upper phase represents a pure extract without undesirable trace materials. The obtained extracts are ready for various purposes of use, whether in the food industry or in the pharmaceutical industry.

Table and Figures

Table 1 Granulometric analysis of Ginseng

Size of strainer	Measuring vessel gr	Vessel + raw material gr	Netto gr
8.00 mm	448.1	448.1	0
4.00 mm	430.82	430.82	0

2.00 mm	399.7	400.95	0.25
1.00 mm	362.8	364.25	1.45
0.50 mm	322.5	324.89	2.39
0.25 mm	290.1	304.11	14.01
0.125 mm	279.48	294.62	15.14
Sludge	400.88	417.64	16.76

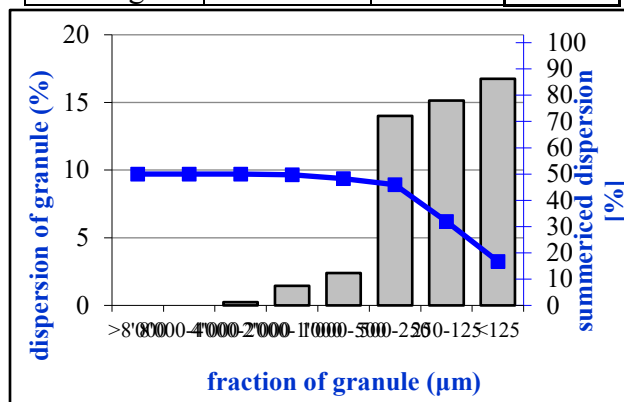


Figure .1 Fraction of granule Ginseng

Table.2 results of dry mass in relation with the extraction time of Ginseng Sample 1 ,2

Sample 1	
Time(min)	Dry content (%)
0	0
1	0.23
10	0.96
24	1.26
30	1.44
45	1.78
60	2.08
Sample 2	
Time (min)	Dry content (%)
0	0.11
1	0.55
10	0.89
24	1.52
30	1.79
45	2.17
60	2.59

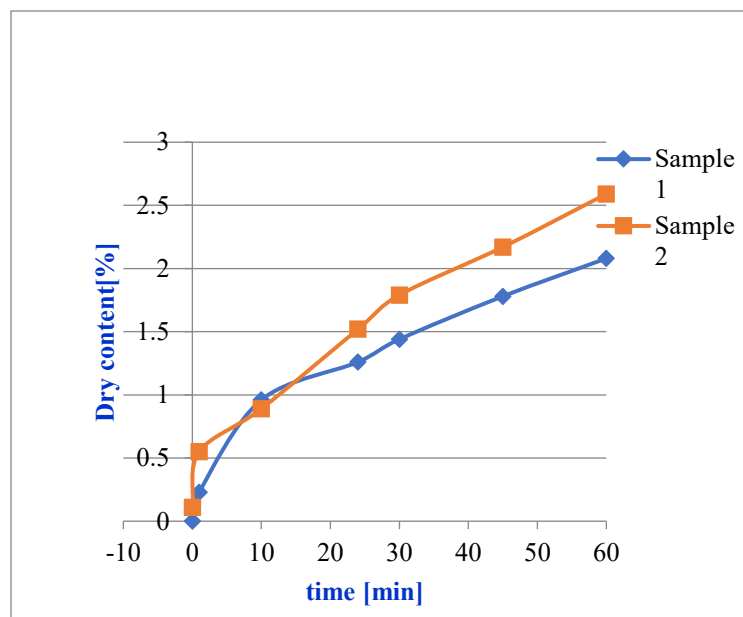


Figure.2 Outline of extraction Ginsengs sample 1 ,2

Conclusion

Based on the results obtained from the first and second analysis, we can conclude that the maceration extraction method is ideal for this product. From the two analyses, it is found that the solvent concentration should be higher than 50% and increasing the solvent concentration is in favor of increasing the extraction coefficient. Great care should also be taken with the degree of fineness during grinding, since finely ground Ginseng can cause technical problems during filtration. Based on the results from the two analyses, it is observed that the dry mass for the second analysis is higher. From the extraction diagram, it can be concluded that for both analyses the upper extraction limit has not been reached, which means that the maceration time should be extended..

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