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RESEARCH ARTICLE

Optimization and functional properties of ginseng root extract in Chyawanprash

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ABSTRACT

In addition to being employed as therapeutic agents, ginseng roots are now sold as nutritional supplements and as a raw material for health foods. The main aim of this study was to determine the total ginsenoside, total polyphenol, total flavonoid content, and antioxidant activity of ginseng root extract. The optimization of ginseng root extract was also done in Chyawanprash. Traditional ginseng medicines and food supplements are the most popular herbal products worldwide. The total ginsenoside, polyphenol, flavonoid content were found as 36.29±0.01, 31.24±1.22, 21.17±0.2 respectively. The DPPH & ABTS radical scavenging activity were investigated as 46.33±0.01 and 40.21±0.00 in Ginseng root extract. The treatment sample T3 had 1.0 percent ginseng root extract, given the highest score for taste and flavour by sensory panellists. Finally, the Chyanwanprash with additional functional properties and specific flavour was successfully developed.

Keywords: Chyawanprash, ginseng root extract, ginsenoside, polyphenol, flavonoid.

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INTRODUCTION

Ginseng *(Panax ginseng)* is a nutritious and widely used herbal medicine (Fig. 1). *Panax* is derived from the Greek word "*panacea*," which means "all-cure." It also implies "longevity," "physical strength," and "innate immunity." The Chinese Ministry of Health authorised grown ginseng (root and rhizome of *Panax ginseng* C. A. meyer) as a "New Food Material" in 2012, despite the fact that ginseng processing has not been thoroughly examined as a food material. On August 29, 2012, state approval allowed five-year-old or younger ginseng to enter the food market and be utilised as a food material in China. As a result, ginseng root is now sold as nutritional supplements and raw materials for health foods, in addition to being employed as a therapeutic agent (Chen et al., 2014).

The ginsenosides, a group of saponins having a dammarane triterpenoid structure, are the most bioactive components of *P. ginseng* (Huang, 1999). Almost 50 ginsenosides have been isolated from *Panax quinquefolius* (American ginseng) and *Panax japonica* (Japanese ginseng) root (white and red ginsengs), and novel structures are still being discovered, particularly in the

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berries of *Panax quinquefolius* (American ginseng) and *Panax japonica* (Japanese ginseng) (Gillis, 1997; Yoshikawa,1998; Attele et al., 2002, Christensen, 2009).

Fig. 1: Ginseng roots collected from local Indian market

Ginseng is rich in variety of antioxidant compounds and is widely employed as a traditional medicinal plant. The chief component of ginseng is ginsenosides which contains polyphenols and flavonoids, such as gentisic acid, p- and m-coumaric acid, chlorogenic acid, and rutin, which are known as typical constituents of ginseng, have strong antioxidant properties. Despite the functional actions of this, several studies have been found to show low sensory scores due to the bitterness (Kim et al., 2019, Eom et al., 2017, Choi et al., 2015).

The anticancer, antidiabetic, immunomodulatory and strengthening central nervous system functions such as learning, memory, and neurodegenerative disorders are reviewed in relation to ginseng's pharmacological and therapeutic uses, notably ginsenosides. The goal of this study is to find out about the total polyphenol, flavonoid content, DPPH radical scavenging activity, Analysis ABTS radical scavenging activity, and total ginsenoside content of ginseng root extract. Ginseng root extracts contain a variety of ginsenosides as key active components, which have been shown to have anti-cancer and anti-aging properties (Jung et al., 1996).

The inclusion of ginseng root extract contributes to Chyawanprash's therapeutic properties in several ways. As ginseng root extract taste is bitter and astringent, it's incorporation to any food product is a matter of concern because it may affect the sensory qualities. In this investigation, different concentrations of ginseng root extract were employed in various treatments. All the samples were tested for the organoleptic properties, and the best one was accepted.

MATERIALS AND METHODS

Ginseng extract preparation

Only the root parts of ginseng were used, and ginseng root was rinsed, cut into small pieces, dried at 60 ◦C for 24 h, and then milled and separated using a 100-mesh screen. Sample of ginseng powder (25 g) was extracted with 500 ml of 70% ethanol in a reflux system at 70 ◦C for 6 h, and the extraction was performed in triplicate. Whole extracts were filtered using Whatman

filter paper No. 2 and concentrated using a rotary evaporator (N-1000V, EYELA, Tokyo, Japan) system at 60 ◦C. The concentrates were lyophilized and then stored anaerobically at 4◦C until use.

Experimental treatments

The experimental plan used for present research is given in Table 1 below:

Table 1: treatment detail

Parameter	Level	Description
Product	1	Chyawanprash
Samples	4	T1 (Ginseng extract 0.1%)
		T2 (Ginseng extract 0.5%)
		T3 (Ginseng extract 1.0%)
		T4 (Ginseng extract 1.5%)
Analysis		Sensory Analysis

Analysis of total polyphenol and flavonoid content

The modified method from Singleton and Lamuela-Raventos was used to determine total polyphenol content of ginseng root extraction (Singleton and Rossi, 1999). The colorimetric assay was used to determine total flavonoid content of ginseng root extraction (Woisky and Salatino, 1998).

The HPLC analysis was used Agilent 1100 system (reverse phase C18 column) and a UV spectrophotometric detector. The column temperature was maintained at 30℃. The mobile phase included solvent A (water) and solvent B (acetonitrile). The flow rate of solvent was 1 mL/min. The eluate was measured at 203 nm wavelength and 10 µL injection volume.

Analysis DPPH radical scavenging activity

The DPPH radical scavenging activity was measured by the method from (Yang et al., 2006). The DPPH power (2.5 mg) was dissolved in 10 mL ethanol and mixed completely. DPPH solution in ethanol (2 mL) was added to 2 mL sample solution. The absorbance of the extract was measured at 514 nm at room temperature, using ethanol as the blank.

$$\mathbf{SA}\ (\%) = \mathbf{1} - \frac{(\boldsymbol{A_I} - \boldsymbol{A_J})}{\boldsymbol{A_0}} \times \mathbf{100}$$

AI indicated absorbance of DPPH and sample; AJ indicated absorbance of sample and ethanol; A0 indicated absorbance of DPPH and ethanol.

Analysis ABTS radical scavenging activity

The ABTS antioxidant activity was analyzed using the method of (Hu and Kitts, 2001). The 7 mM ABTS stock solution was mixed with 2.45 mM potassium persulfate as ABTS radical cation in darkness for 14 h. The absorbance of ABTS solution was adjusted to 0.7 with distilled water. The ginsenoside root extract 50 µL was added to 2 mL ABTS radical solution for reacting 6 min. The spectrophotometer was used to determine the ABTS antioxidant activity at 734 nm using trolox as positive control.

$$\text{Inhibition ratio (\%)} = (A0-A1)/A0\times100$$

Where A0 is the absorbance of the control, and A1 is the absorbance of the test sample.

RESULTS AND DISCUSSION

The treatment sample T_3 was assigned maximum sensory scores based on taste and flavour. The ginseng extract show bitterness which might be due to triterpenoid peptides or propylene glycol (Tamamoto et al., 2010). No significant degree of bitterness was observed in case of T3 sample thereby given maximum sensory scores.

Total ginsenoside content of ginseng root extraction under PEF was 36.29±0.01. The average total ginsenosides content of NZ-grown ginseng was 40.06 ±3.21 mg/g, which was significantly ($p< 0.05$) greater than that of China-grown ginseng (16.48± 1.24 mg/g) and Korea-grown ginseng (21.05±1.57 mg/g) (Wei Chen et al., 2019). In ginseng extract, total polyphenol and total flavonoid concentration were found to be around 31.24±1.22 and 21.17±0.2, respectively.

Ginseng root extract had a DPPH and ABTS radical scavenging activity of 46.33±0.01 and 40.21±0.00, respectively. According to the PEF2 technique, the DPPH and ABTS radical scavenging activity was 54.89 percent and 45.83 percent (Lu and Yin, 2005). These results might be related with the altered position of phenolic group. This study showed that the Ginseng root extract has strong anti-oxidant activity and it might helps to fight against cancer.

Table 2: Functional Properties of Ginseng Root Extract

Parameter	Ginseng root extract
Total ginsenoside content	36.29±0.01
Total polyphenol content	31.24±1.22
Total flavonoid content	21.17±0.2
DPPH radical scavenging activity	46.33±0.01
ABTS radical scavenging activity	40.21±0.00

The content (mg/g) of ginsenosides in ginseng samples (mean ± SD)

CONCLUSION

The addition of ginseng extract at a concentration of 1.0 percent, on the other hand, had no significant effect on the overall quality score, according to our research. Ginseng, being a prominent health tonic has a number of health advantages like increasing stamina, reducing the sexual problem and risk of paralysis, stimulating salivary gland and aid digestion, supporting nervous system and strengthening spinal cord, regulating blood sugar level and many more. The presence of ginsenoside, flavonoid, polyphenol, and antioxidant concentration in ginseng root extract gives it these abilities. To increase the quality of life, it is necessary to maximise the functional characteristics of ginseng and apply them to various types of food vehicles.

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