

# Polyphenol Content and Antioxidant Effects in Herb Teas

Shizuo Toda

Department of Health Sciences, Kansai University of Health Sciences, Osaka, Japan

E-mail: [toda@kansai.ac.jp](mailto:toda@kansai.ac.jp)

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## Abstract

Herb teas, Arabian jasmine, Balsam pear, Barley grass, Guava, Hardy rubber tree, Japanese persimmon, Jobs tears, Oolong tea, Puerh tea and Wolofberry have been consumed as beverages for health in Asia. Oxidative stress induces various diseases. Some of them, Arabian jasmine, Guava, Hardy rubber tree, Japanese persimmon, Oolong tea and Puerh tea, have high total polyphenol content and antioxidant activities. Herbs and herbal polyphenols pay in controlling oxidation and prevent the damage by oxidation. These results showed that some of them, Arabian jasmine, Guava, Hardy rubber tree, Japanese persimmon, Oolong tea and Puerh tea, have high total polyphenol content and antioxidant activities. It has been demonstrated that high total polyphenol content in the herb teas provides high antioxidant activities.

**Keywords:** Antioxidant Effect, Herb Tea, Polyphenol

## 1. Introduction

Reactive oxygen species and free radicals induce oxidative stress. Oxidative stress is related to acute lung injury, acute respiratory distress syndrome and hyperoxia, aging, cardiovascular diseases as hypertension and myocardial infarction, cancer, diabetes, eye disease as age-related macular degeneration, immune diseases as inflammation and autoimmune disease, kidney disease, liver disease, neurological diseases as Alzheimer's disease, Huntington's disease and Parkinson's disease, and pancreatitis [1-3].

The antioxidant pays in controlling oxidation and prevents the oxidation induced damage. They are, amino acid (N-acetyl cysteine, L-arginine, glutathione, glycine, histidine, taurine and thiols), enzyme (catalase and superoxide dismutase), mineral (copper, iron, selenium, zinc), natural product (allicin, anthocyanin, biochanin A, carotenoids, cucumin, ellagic acid, epigallocatechin-3-O-gallate, flavonoids, glucosinolates, naringin, phytyc acid, polyphenol, quercetin), protein (albumin, bilirubin, ceruloplasmin, glutathione, lactoferrin, thioredoxin and transferrin), vitamins (nicotinamide, retinol, riboflavin, vitamin C, vitamin E), and urate [1-4].

Herbs have been consumed for food and medicinal purposes. They have a wide variety of active phytochemicals, including allicin, anthocyanin, biochanin A, carotenoids, coumarins, curcumins, ellagic acid, epigallocatechin-3-O-gallate, flavonoids, lignans, phthalides,

phytic acid, plant sterols, polyphenols, saponins, sulfides and terpenoids. They contain potent antioxidant compounds, prevent oxidative stress and provide significant protection against chronic diseases [5,6].

Tea is a rich source of polyphenolic flavonoids which exhibits potent antioxidant activity *in vitro* and *in vivo*. The polyphenolic flavonoid content of tea depends upon the type and preparation method. Randomized clinical examining the effect of tea on putative intermediary biomarkers suggest a potential health benefit from tea consumption [7].

Herb teas, Arabian jasmine, Balsam pear, Barley grass, Guava, Hardy rubber tree, Japanese persimmon, Jobs tears, Oolong tea, Puerh tea and Wolofberry have been consumed beverages for health in Asia, and especially Japan.

This article investigates total polyphenol content and antioxidant activities of these herb teas were investigated.

## 2. Materials and Methods

### 2.1. Materials

The tested herbs, Arabian jasmine, Balsam pear, Barley grass, Chameleon plant, Guava, Hardy rubber tree, Japanese persimmon, Jobs tears, Oolong tea, Puerh tea and Wolofberry, were from Yamamoto Kampo Co. (Aichi, Japan). They were of commercial grade.

Ascorbic acid, glutathione and tannic acid were purchased from Wako Pure Chemicals Co. (Osaka, Japan). PAO-antioxidant assay kit was purchased from Japan Institute for the Control of Aging (Shizuoka, Japan). Other common laboratory reagents were of analytical grade.

## 2.2. Preparation of the Herb Tea-Water Extract

1 g of the tested herb was extracted with 20 mL of hot water and stirred for 20 min. The water extract was filtered. The filtrate was allowed to stand at 25°C. The filtrate was diluted to 1% with water as test sample.

## 2.3. Determination of Total Polyphenol Content

The total polyphenol content of the water extract was determined by the Folin-Ciocalteu colorimetric method [8]. 0.5 mL tested sample was mixed with 0.5 mL of Folin-Ciocalteu reagent and 0.5 mL of 10% sodium carbonate solution. After mixture was incubated at room temperature for 1 h, the absorbance was measured at 760 nm. The total polyphenol was expressed as mg/g tannic acid equivalent.

## 2.4. Antioxidant Assay

The antioxidant activity of test sample was assayed by PAO-antioxidant assay kit (Japan Institute for the Control of Aging, Shizuoka, Japan). The antioxidant activity was mmol/L as copper reducing power [9].

## 2.5. Statistical Analysis

The values were expressed by the means of  $\pm$  standard deviation (SD) of five experiments. The results were analyzed by the nonparametric analysis of variance (ANOVA)- Scheffe *F*-test.

## 3. Results

**Table 1** shows the total polyphenol content of the herb tea-water extract. The total polyphenol content of Arabian jasmine, Guava, Hardy rubber tree, Japanese persimmon, Oolong tea and Puerh tea-water extract was more than that of others.

**Table 2** shows the results of antioxidant assay. The antioxidant activities of Arabian jasmine, Guava, Hardy rubber tree, Japanese persimmon, Oolong tea and Puerh tea-water extract were higher than those of others at 50.0 mg/mL of the herb tea-water extract. The antioxidant activities of ascorbic acid and glutathione are  $11.38 \pm 1.76$  and  $2.63 \pm 1.27$  mmol/mM at 1.0 mM of those re-

agents.

## 4. Discussion

Herbal medicines have been consumed and played an important role in the world. Wargovin demonstrated that the widespread use of herbs either directly or indirectly supplements, may prevent cancer, and help health promotion [10]. The tested herbs, Arabian jasmine, Balsam pear, Barley grass, Hardy rubber tree, Japanese persimmon, Jobs tears, Oolong tea, Puerh tea and Wolofberry, were consumed as beverages for health in Asia.

Green tea polyphenols, epicatechin, epigallocatechin gallic acid and epigallocatechin gallate inhibit production of oxidative stress. Oxidative stresses induce various diseases, heart disease, renal disease and failure, skin

**Table 1. Total polyphenol content of herb tea-water extract.**

Herb tea-water extract	Total polyphenol content (mg/g)
Arabian jasmine	101.2 $\pm$ 17.8
Balsam pear	14.5 $\pm$ 2.6
Barley grass	10.5 $\pm$ 1.5
Guava	83.0 $\pm$ 5.9
Hardy rubber tree	43.4 $\pm$ 4.8
Japanese persimmon	41.3 $\pm$ 6.7
Jobs tears	4.2 $\pm$ 1.4
Oolong tea	120.9 $\pm$ 14.8
Puerh tea	40.4 $\pm$ 7.2
Wolofberry	17.1 $\pm$ 4.2

The Total polyphenol content of the herb tea-water extract was determined by Folin-Ciocalteu colorimetric method. The value was expressed as the mean  $\pm$  SD of five experiments.

**Table 2. Antioxidant activity of herb tea-water extract.**

Herb tea-water extract	Antioxidant activity
Arabian jasmine	144.0 $\pm$ 1.4 mmol/L
Balsam pear	19.7 $\pm$ 2.4 mmol/L
Barley grass	9.2 $\pm$ 0.5 mmol/L
Guava	172.5 $\pm$ 2.0 mmol/L
Hardy rubber tree	45.5 $\pm$ 2.3 mmol/L
Japanese persimmon	65.7 $\pm$ 1.8 mmol/L
Jobs tears	7.4 $\pm$ 1.7 mmol/L
Oolong tea	184.8 $\pm$ 2.7 mmol/L
Puerh tea	59.1 $\pm$ 2.2 mmol/L
Wolofberry	20.1 $\pm$ 0.7 mmol/L
Ascorbic acid	139.7 $\pm$ 0.5 mmol/L
Glutathione	76.6 $\pm$ 9.5 mmol/L

The antioxidant activity of test sample was assayed by PAO-antioxidant assay kit. The value was expressed as the mean  $\pm$  SD of five experiments.

exposure damage caused by ultraviolet rays, and diseases associated with aging. Green tea polyphenols have antioxidant effects, such as cancer prevention and inhibition, obesity and weight controlling. [11]. The daily intake of polyphenol has been showed ~1 g/d. given diet including some common fruits, vegetables and beverages [12].

The presented herb teas have various effects [13-22]. **Tables 1** and **2** show that some of them, Arabian jasmine, Guava, Hardy rubber tree, Japanese persimmon, Oolong tea and Puerh tea, have high total polyphenol content and antioxidant activities.

These results demonstrated that the high total polyphenol content in the herb teas provides high antioxidant effects.

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