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FORMULATION OF HERBAL BREWED TEA AND ITS NUTRACEUTICAL PROPERTIES

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Abstract

India has about 45000 plant species of plants, of which several thousands have been claimed to possess medicinal properties. In many countries traditional medicine forms an internal part of health care system. Herbal tea is essentially an herbal mixture made from leaves, seeds and/ or roots of various plants. As per popular misconception, they are not derived from the usual tea plants, but rather from what are called as 'tisanes'. Anti-inflammatory Property of Methanolic extract of Cassia auriculata flowers (MECA) and leaves exhibited profound anti-inflammatory activity in both acute and chronic animal models. The red variety of hibiscus are the most used are characterized by their concentration anthocyanin. Delphinidin 3-Sambubioside and Cyanidin3 Sambubioside are the major anthocyanin. Roselle is also rich in organic acids, minerals, amino acids, carotene, vitamin C and total sugar in its calyx, leaves and seeds at variable levels depending on the variety and geographical area. According to Manita-mishra, a number of compounds have also been isolated and characterized from Roselle including flavonoids, anthocyanidins, triterpernolds, steroids and alkaloids. Lemon grass have been used for its medicinal properties and advantageous impact on the health, for example, digestive stimulus activity, antioxidant activity, antimicrobial action, anti-inflammatory, hypolidemic, anti-carcinogenic activity and ant mutagenic effects. Mint leaves generally contains menthol (40.7%), menthone (23.4%), menthylacetate (0.7-23%), eucalyptol (1-13%), carvel (0.31%), pipertone (3.20%) and fibre (1.75%). The important nutritional contents include iron (0.262%), calcium (0.158%), and physic acid (0.00092%), proteins (0.6%), vitamin E (9.89), ascorbic acid (0.96%) and axerophthol (0.426).

Key words: Tisanes, Hibiscus, Anthocyanin, menthol in mint, anti carcinogenic effect, antioxidant, anti microbial action.

Introduction

Plants and plant products have been utilized with varying degrees of success to cure and prevent diseases throughout history. Therapeutically interesting and important drugs can be developed from plant sources, which are used in traditional systems of medicine. The Indian traditional system of medicine is based on empirical knowledge gained through millennia of observations and experiences, with more than 5000 plants being used by different ethnic communities in India.

Traditional herbal medicines have a long history of use and are generally considered to be safer than synthetic drugs. Over 50 percentage of all modern clinical drugs are natural products that play an important role in drug development in pharmaceutical industries.

Herbs have been traditionally exploited as medicines for many centuries. Today, an estimated 60–80% of the world's population depend on medicinal herbs for their healthcare needs. Herbal teas are widely represented in the traditional medicine of various cultures, due to their health-promoting activities that include anticancer, antimicrobial, antidiabetic, anti-inflammatory and antioxidant properties. Herbal teas often have purging effects and may aid with stomach-related problems in addition to boosting the immune system

The present communication constitutes a review on the distribution, phytography, medicinal properties and pharmacological actions of Cassia auriculata ***(*Meenupriya *et al*., 2014)**

A popular Asian beverage and medicinal plant called Cassia auriculata (Caesalpiniaiceae) is used for treating diabetes, hyperlipidemia, and a number of other diseases in traditional Asian medicine.

Methodology

Collection of raw material

- The Cassia auriculata flowers were collected from nearby forest in Tiruvannamalai, Tamil Nadu, India. Sample were collection of during the flowering period from September to February (2022-2023).
- The Hibiscus rosa-sinensis flowers were collected from nearby botanical garden in Periyar University Salem.
- The Cymbopogon Citratus leaf were collected from nearby botanical garden in district Tiruvannamalai, Tamil Nadu, India.
- The Mentha arvensis leaves were collected from nearby shop in Tiruvannamalai, Tamil Nadu, India.

Processing of selected herbals

Fresh and insect free flower petals and selected herbal leaves were cleaned and used for the study.

The selected cleaned flowers and leaves were processed under shadow drying for 6-10 days till complete removal of moisture content.

Moisture free dried sample were powdered using pistal motor and sieved using 40 mesh and collect the powdered samples for the study.

Flower and Leaf Harvesting

The plant parts such as flowers and leaves were used for the preparation of herbal tea which helps to boost the immunity. The samples were collected from the forest and botanical garden in and around the researcher's home town.

Selection of healthy Petals and Leaves

The collected flowers and leaves were graded and removed the unhealthy samples manually. Healthy flowers and leaves were used for the further research of the study.

Washing

The selected fresh flowers and leaves were washed to remove the dirt particles. Drain the water present in flower and leaves and allowed to drying process.

Drying

Among various drying technique, the study followed to 'Shade Dry' technique for this research work. The samples were spread on a clean white cloth and dried for 6 to 10 days under shadow drying for the complete removal of moisture in it.

Grinding

The dried leaves were grinded into powder using pistal motor and sieved into fine powder and remove the hard particles.

Packaging

Packed in a transparent white disposable tea filter bags which is made of cotton. Tea bags are packed the amount of 5.5g of herbal powder and completely safe to use and bio-degradable after disposal.

Table-1 Ingredients used for preparation of herbal tea bag

INGREDIENTS	HTV1	HTV2	HTV3	HTV4
Cassia auriculata Powder	1.5 g	2 g	2.5 g	3 g
Hibiscusrosa-sinensis Powder	0.5 g	0.5 g	0.5 g	0.5 g
Cymbopogon citratus Powder	0.5 g	0.5 g	0.5 g	0.5 g
Mentha arvensis Powder	0.5 g	0.5 g	0.5 g	0.5 g
Cardamom powder	0.5 g	0.5 g	0.5 g	0.5g
Total	3.5 g	4.0g	4.5 g	5 g

**HTV – Herbal Tea Variation*

Results & Discussion

Sensory evaluation of the developed herbal tea bag

A panel of 20 untrained judges were performed the sensory evaluation threshold test which was comprised by the students of Nutrition & Dietetics department from Periyar University, Salem.

The panel members were supplied with four variations of herbal tea and asked to mark the score card for all the given variations.

The evaluation was carried out using 9-point hedonic scale (where1=dislike extremely, and 9=like extremely). The parameters used for the evaluation of the given variation were colour, appearance, taste, flavour, mouth feel, and over all acceptability.

Table-2 Statistical analysis of sensory evaluation of the developed herbal tea

Samples	Appearance	Colour	Mouthful	Aroma	Taste	Overall Acceptability
Variation HTV1	6.75±0.64	7.35±1.14	7.40±0.99	7.05±0.94	7.00±0.86	7.05±0.68
Variation HTV2	7.35±0.98	7.30±0.86	7.25±0.64	7.45±1.02	7.10±0.91	7.20±0.76
Variation HTV3	7.15±0.87	7.48±0.88	7.40±0.88	7.10±0.78	7.15±0.98	7.45±0.68
Variation HTV4	7.23±0.88	8.00±0.97	7.75±0.91	7.65±0.96	7.78±0.91	8.10±0.71

The result showed that there were noticeable difference between variations of herbal tea for the parameters such as appearance, colour, mouthful, aroma, taste, and overall acceptability. The result of above table revealed that the mean score obtained for appearance is high in variation2 (7.35±0.98) compared to other variations. The colour of variations 4 was found to be (8.00±0.97) which was higher than variation1, variation2 and variation 3. Mean score of mouthful was high (7.75±0.91) in variation4 compared to other variations. The results revealed that the mean score obtained for aroma of variation4 (7.65±0.96) was found to be superior compared to other variations. The taste was highly acceptable for variation4 with a score of (7.78±0.91). The overall acceptability was greatest in variation4 (8.10 ±0.71) compared to other variations. Result on ANOVA Duncan Multiple Range test showed that there was a significant different ($p<0.05$) between variations of herbal tea on appearance, colour, mouthful, aroma, taste, and overall acceptability .Based on the sensory evaluation of the developed herbal tea 5 percent of herbal powder incorporated herbal tea bag (variation 4) was more acceptable and excellent. in taste.

Phytochemical properties of the best variation of the herbal tea

Table-3 Phytochemical properties of the best variation of herbal tea

S.no	Phytochemical	Best variation htv4	Composition (in mg/gm)
1	Lignins	HTV4	0.5
2	Flavonoids	HTV4	12.4
3	Carotenoids	HTV4	5.8

It indicates that Lignins 0.5mg/gm. are present about, Flavonoids are present about 12.5mg/gm and Carotenoids are present about 5.8mg/gm, in 100g of herbal powder. The result for accepted variation was similar according to the report by **(A. Rajendran, C. Karthikeyan 2012).**

Antioxidant activity of accepted variation herbal variation 4

Table-4 Antioxidant activity of accepted variation herbal tea powder

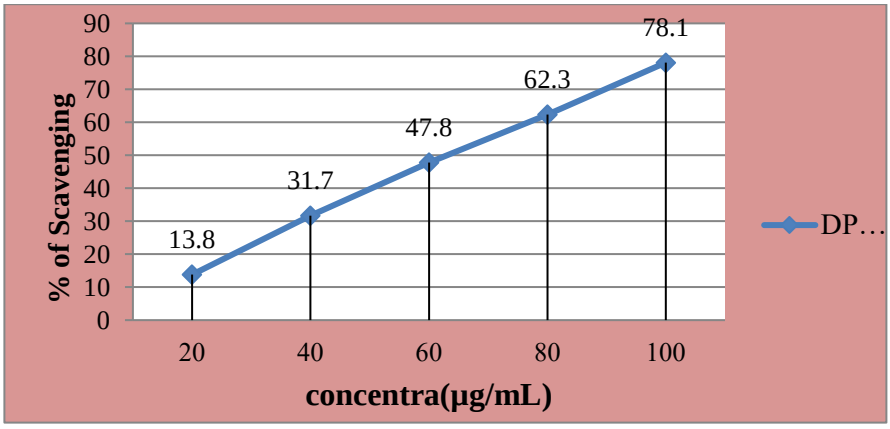
S.N0	PARAMETER	RESULT
1	Total antioxidant activity	180µg of AAE/ gm

Above table indicates the total anti-oxidant level activity found in herbal tea which is of 180µg of AAE/g. The result of total anti-oxidant activity of the developed herbal tea was similar to the report published by (**Hyeri Kim *et al.*, 2017**).

The reaction mixture was incubated in dark condition at room temperature for 20 min. After 20 min, the absorbance of the mixture was read at 517 nm by UV-Vis Spectrophotometer. 3ml of DPPH was taken as control.

To measure emulsifying capacity, an amount of surimi powder was added to 25 mL of distilled water and 25 mL of corn oil to give a final concentration of about 0, 0.5, 1, 1.5 and 2% [10]. The mixture was blended (Waring Commercial blender, Stamford, CT, USA) for 1 min and transferred to a 50 mL calibrated centrifuge tube and centrifuged (Hettich Universal 30 RF) at 7500 g for 5 min. Emulsifying stability was determined by the same procedure except that before the sample was centrifuged, the emulsion was

$$\% \text{ RSA} = \frac{\text{Abs control} - \text{Abs sample}}{\text{Abs control}} \times 100$$



Free radical scavenging activity

Volatile flow of dried herbal tea, using gas chromatography method

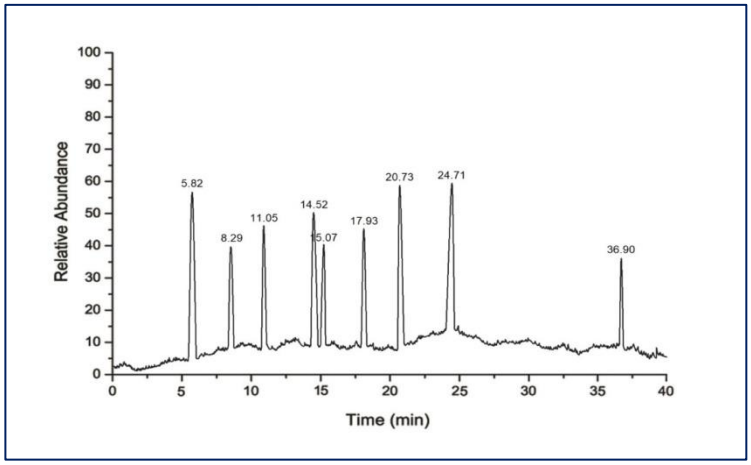


Figure- 10 Volatile flow of dried herbal tea, using gas chromatography method

The peak value sample present given sample reach 24.71 nm was measured using Perkin Elmer Elite-5capillary are column measuring 30m × 0.25mm with a film thickness. Measurement of peak areas and data processing were carried out by Turbo-Mass OCPTVS-Demo SPL software. Level of the votalile substance present: 24.71nm.

Nutritional Information

Table-5 Nutritional information

S.NO	PARAMETER	RESULT
1	Vitamin C	35mg/100mg

Above table indicates the Vitamin C level found in herbal tea which is of 35mg/100mg. The result of Vitamin C of the developed herbal tea was similar to the report published by **Chanu T (2012).**

Shelf life of the accepted variation of the herbal tea

Table-6 Shelf life of the accepted variation of the herbal tea

S.No	No of Days	Colour	Taste	Aroma
1	7	Bright colour	Extremely good	Extremely good
2	14	Good colour	Very good	Extremely good
3	21	Moderately	Good	Extremely good
4	28	Slightly change	Moderately	Moderately

The accepted developed product herbal tea was bright in colour, extremely good in taste and extremely good in aroma to 7 days, when it was stored in a white cotton muslin cloth tea bag. The accepted developed product herbal tea

was good in colour, very good in taste and extremely good in aroma to 7-14 days, when it was stored in a white cotton muslin cloth tea bag.

The accepted developed product herbal tea was moderately in colour, good in taste and extremely good in aroma to 14-21days, when it was stored in a white cotton muslin cloth tea bag.

The accepted developed product herbal tea was slightly change in colour, moderately in taste and moderately in aroma to 21-28 days, when it was stored in a white cotton muslin cloth tea bag.

According to the shelf life of the accepted developed product (herbal tea) it is observed that in about 28 days of storing the herbal powder in a white cotton muslin cloth tea bag. There was some colour, taste and aroma changes in herbal powder .Which indicate the spoilage of the accepted developed product

Comparative of sensory evaluation of commercial and formulated herbal tea

Table -7 Comparative of sensory evaluation of commercial and formulated herbal tea

Samples	**Appearance**	**Colour**	**Mouthful**	**Aroma**	**Taste**	**Overall Acceptability**
Herbal Tea **V4**	7.23±0.88	8.00±0.97	7.75±0.91	7.65±0.96	7.78±0.91	8.10±0.71
Green Tea	7.50±0.68	7.87±0.97	7.47±0.97	6.37±1.00	6.60±0.90	7.43±0.72

The above values mentioned are mean and standard deviation of the parameters for sample herbal tea. The result showed that there were noticeable difference between herbal tea and green tea for the parameters such as appearance, colour, mouthful, aroma, taste, and overall acceptability. The result of above table revealed that the mean score obtained for appearance is high in commercially available green tea (7.50±0.68) compared to herbal tea. The colour of herbal tea was found to be (8.00±0.97) which was higher than commercially available green tea. Mean score of mouthful was high (7.75±0.91) in herbal tea compared to commercially available green tea. The results revealed that the mean score obtained for aroma of herbal tea (7.65±0.96) was found to be superior compared to commercially available green tea. The taste was highly acceptable for herbal tea with a score of (7.78±0.91). The overall acceptability was secured highest value in herbal tea (8.10 ±0.71) compared to commercially available green tea. Result on paired sample t-test test showed that there was a significant difference ($p<0.05$) between herbal tea and commercial green tea on appearance, colour, mouthful, aroma, taste, and overall acceptability. Based on the sensory evaluation of the developed herbal tea to green tea was more acceptable and excellent. Hence, the untrained panel members examined result shows highest score was given to herbal tea.

Cost calculation of the accepted herbal powder incorporated herbal tea bag

Ingredients	**Quantity Purchased**	**MRP (In Rupee)**	**Quantity**	**Cost For 5g of Herbal Tea Bag(In Rupee)**
Cassia auriculata flower powder	100g	40	3 g	1.2
Hibiscus rosa-sinensis powder	50g	10	0.5 g	1

Cymbopogon citratus powder	50	10	0.5 g	1
Mentha arvensis powder	50g	10	0.5 g	1
Cardamom powder	20g	10	0.5g	1
Empty tea bag	10 pieces	20	1	2
Total		110		7.2

Table-8 Cost calculation of the developed herbal tea

The cost calculation for the production of 5g of developed herbal tea bag revealed that the total production cost (1piece) was Rs.7.2 by incorporated herbal powder, and cardamom powder. Commercially available tea bag (1 piece) is Rs.10.00. It was evident that the developed herbal tea bags were more economical and affordable when compared with commercial tea bag in the market.

Statistical analysis of the developed herbal tea products

The data obtained from various experiments were subjected to statistical analysis by using SPSS 16.0 software to find out the impact of the developed products were employed for the analysis with ANOVA Duncan multiple range test. The details of the statistical analysis are given as follows.

Table-9 Statistical analysis of herbal tea

Sample	Mean±S.D	Sum of Square	Mean Square	F Value	P Value
Variation-1	7.05±0.68	Between groups (16.54) Within groups (38.65)	Between groups (5.512) Within groups (0.509)	10.840	0.000
Variation-2	7.20±0.76				
Variation-3	7.45±0.68				
Variation-4	8.10±0.71				

It has been observed that the p-value ($p \leq 0.05$) for the overall acceptability was 0.00 which indicates that there was significant change observed in the variations 4 of developed product. The variation-4 was preferred by the untrained panel members for its overall acceptability.

Conclusion

- Herbs are an integral part of the diet and now days it is unfairly used by manufactures as business on large scale. Herbal tea is the popular recipes which have appreciable demand amongst the consumers. Consumer interest is increasing in functional foods and this has led to the demand of such products in the market. In this dissertation, the utilization of underutilized herbs to develop herbal tea. Herbs are usually taken in normal level as food, but they are rich source of nutrients especially fiber, vitamin C, phenolic, flavonoids, carotene and other antioxidants. It was concluded that herbal tea are low cost, high in nutrients and antioxidants so the developed herbal tea is a good choice of normal human diet to lead a healthy life style .

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