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STUDIES ON DEVELOPMENT OF HERBAL TEA WITH INCORPORATION OF *CORDIA DICHOTOMA*

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ABSTRACT

The aim of this dissertation is to deploy and develop Herbal tea with the incorporation of *Cordia dichotoma*, Ginger & Cinnamon to spread awareness about the health benefits of *Cordia dichotoma* and other ingredients. Various varieties of Herbal tea are present in the market but no one contains the *Cordia dichotoma* in it. It comes under the category of RTS product. An ethno medicinal important plant, *Cordia dichotoma* is practiced in indigenous systems of medicine and is popular among the various ethnic groups in India for the cure of a variety of ailments such as astringents, anthelmintic, diuretic, demulcent, anti-diabetic, and expectorant. Physico-chemical, sensory and economic analysis of raw materials and the final product was carried out. The process of making Herbal tea is followed by the drying of leaves. The leaves of *Cordia dichotoma* were dried in a hot air oven at 45^0C for 5-6 hours. All the ingredients such as *Cordia dichotoma* (leaves and fruit), Ginger, and Cinnamon, which are coarsely grounded are mixed together. After preparation of Herbal tea, proximate analysis has been done by AOAC 20th Ed 2016) Chapter no.4 method. The determined protein, fat, fiber, moisture, ash, and Energy value is 18.59, 8.9, 13, 6.6, 10.4 and 12.36 respectively. Micronutrients are also detected by method AOAC 20th Ed 2016. Ca, Fe, Zn, K, P, Mn, Cr, Mg, Na, Cu were present. A Sensory evaluation of the sample was carried out. Evaluation is done by the hedonic scale under the ten semi-trained judges. Parameters of the hedonic scale include Aroma, Color, Flavor, Taste, Mouth feel, after taste, overall acceptability is 7,8,8,9,9,9, and 8 respectively.

Keywords: *Herbal tea, Cordia dichotoma, Dried Ginger, Cinnamon, incorporation*

Introduction

Tea is the most consumed beverage in the world, but its origination is attributed to China and comes as an important food product in the world. After China, India is the 2nd largest producer and consumer of tea in India. Due to the growing consciousness and concern of the common public, there is an increasing demand for more natural and immunity-building foods and beverages, especially after the onset of COVID-19. This is where tea seems to be a good vehicle because of its good taste, aroma, wide acceptability and versatility. Hence tea belongs to a quickly growing market of wellness beverages. Traditionally, tea is classified as green, Oolong, black, and red tea and can be differentiated on the basis of their processing stages at the time of manufacturing. Camellia sinensis is the plant from which green tea and all kinds of tea are made (Namdev *et. al,* 2015). Green, black and red teas are commercially available in different formulations (bags, leaves, roots, granulates, powders, liquids) and can be prepared by infusion, solubilization, or drunk directly (Barreira *et.al*, 2013). In recent times, however, a fourth category, called herb teas, is gaining increasing popularity among consumers. Herbal tea is a commonly consumed beverage brewed from the leaves, flowers, seeds, fruits, stems and roots of plant pecies rather than Camellia sinensis L., which has been widely used for health care and diseases prevention for centuries (Zhao *et.al,* 2013). Herbal teas are actually mixtures of several ingredients, and are more accurately known as 'tisanes.' Tisanes is made from combinations of dried leaves, seeds, grasses, nuts, barks, fruits, flowers, or other botanical elements that give them their taste and provide the benefits of herbal teas. There are several kinds of tisanes (herbal teas) that have been used for their medicinal properties. Some of them being consumed for its energizing properties to help induce relaxation, to curb stomach or digestive problems and also strengthen the immune system. Some of the popular herbal teas are Hibiscus tea, Chamomile tea, Ginger tea, Ginseng tea, Peppermint tea, Cinnamon tea etc. Some of these herbal teas possess extremely strong medicinal benefits such as, Astragalus tea, a Chinese native herb that is used for its anti-inflammatory and anti-bacterial properties; which in many cases helps people living with HIV and AIDS. (Chandini Ravikumar, 2014). The tisanes of herbal teas and medicinal plant formulations are willingly and habitually consumed in many parts of the world due to their therapeutic and healing properties (Nookabkaew *et. al,* 2006). Consumed in the form of infusions or decoctions, prepared from different parts of medicinal plants, i.e. herbs, flowers, fruits, leaves, seeds, barks, and roots, herbal teas, and medicinal plant formulations play an important preventive role in treating free radical-mediated disorders and supporting medicinal therapy of different chronic diseases (Konieczynski *et. al,*2012).

Material and Methodology

Raw Materials

Cordia Dichotoma

Cordia dicotoma is species of flowering tree in the borage family, Boraginaceae. It is small to a moderate-sized deciduous tree with a short bole and spreading crown the stem bark is grayish brown, smooth, or longitudinally wrinkled. Flowers are short-stalked, bisexual, white in color, and open only at night. Fruit is a yellow or pinkish-yellow shining globose which turns black on ripening and the pulp gets viscid. The fruit is used as a remedy to relieve several diseases such as Anti-diabetic, Immune-modulator, Hepatoprotective, Treatment of inflammation, Bronchitis and astringent, Wounds healing, and Paralytic in folk medicine

Ginger

Ginger is a flowering plant whose rhizome, Ginger root or Ginger, is widely used as a spice and folk medicine. It is herbaceous and grows annual pseudo stems above meter a tall bearing narrow leaf blades it rebels a popular home remedy for Colds, Nausea, Arthritis, Migraines, Hypertension, and Preventing blood clotting.

Cinnamon

Cinnamon is a spice obtained from the inner bark of several tree species from the genus Cinnamon. Cinnamon is used mainly as an aromatic condiment and flavoring additive in a wide variety of cuisines, sweet and savory dishes, breakfast cereals snack food, teas, and traditional foods Loaded with antioxidants, Has anti-inflammatory properties, May cut the risk of heart health, Lowers blood sugar levels, Has anti-diabetic effects, Effects on neurodegenerative diseases, May protect against cancer, Anti-bacterial and anti-fungal

Drying of Leaves

Collecting of leaves | Washing of leaves | Drying of leaves in hot air oven | Grinding of leaves

Flowchart no.1. Drying of leaves

Sensory analysis was done on the basis of hedonic scale three samples were prepared T_0, T_1, T_2, T_3, with different proportions and T_2 was selected on the basis of sensory table no. 1

Table No. 1 Sensory evaluation of Herbal tea

Trials	Color	Flavor	Taste	Appearance	Overall acceptability
T0	8	7	8	7	7
T1	8	7	8	7	7
T2	8	8	8	8	8
T3	6	6	7	8	6

Where,

T_0= control sample

T_1=C.D (leaves25% and fruit 25%), Cinnamon 25%, Ginger 25%

T_2= C.D (leaves50% and fruit 15%), Cinnamon 15%, Ginger 20%

T_3= C.D (leaves40% and fruit 20%), Cinnamon 20%, Ginger 20%

Determination of Physicochemical Parameters

Moisture content, fat content, fiber content, protein content, ash content, techno-economical feasibility.

Moisture content: Moisture content was determined in AOAC, 2005. 10-gram samples were dried in a hot air oven at 105ºC±1ºC in pre-weight dishes until constant weight. The dried sample was transferred to desiccators with dishes and cooled at room temperature. The dish was then weighed and moisture content in percent was calculated from the loss of weight.

$$\%\text{Moisture Content} = \frac{\text{initial Wt - final Wt}}{\text{initial wt. of Sample}} \times 100$$

Ash: 5g of ground sample was taken pre-weighed silica crucible and charred over the heater to make it smoke-free. The crucible with the sample was ignited at 600ºC for 3 hours in a muffle furnace. When the muffle furnace was slightly cooled, the crucible with ash was taken out, kept in desiccators to cool and constant weight was taken. The difference between the weight of the silica crucible as empty and with ash was the amount of total ash. The percent ash was calculated (AOAC, 2005)

$$\%\text{Ash Content} = \frac{\text{Initial wt- final wt}}{\text{initial wt}} \times 100$$

Crude fat: AOAC method IS 3579-1966 reaffirmed 2016 using Soxhlet apparatus to determine the sample's crude fat content. The percent of crude fat was expressed as follows:

$$\% \text{ Fat} = \frac{\text{Final Wt of beaker-Empty Wt of beaker}}{\text{Sample Wt}} \times 100$$

Crude Protein: protein content was determined by using Micro-Kjeldhal AOAC (2016) method. The percentage of nitrogen and protein is calculated by the following equation

$$\text{Nitrogen}(\%) = \frac{(\text{sample titrate-blank titrate}) \times \text{N of } H_2SO_4 \times \text{vol.of digest}}{\text{Sample Wt} \times \text{Aliquot of Digest}} \times 100$$

$$\text{Nitrogen} = \% \text{ nitrogen x} 6.25$$

Crude fiber: Two grams of sample were put into a 250 mL conical flask and 1.25% Sulfuric acid solution was added. The sample was heated for about 30 min and was filtered using a vacuum filter and washed until traces of acid were undetected using pH paper. The Whatman paper 5B which a pore size of 125 micrometers was placed in the Buchner flask. After that, the acid extracted was transferred into a 250 mL conical flask and a 1.25% NaOH solution was added. Digest the contents for half an hour, filter, and wash free of alkali using hot distilled water. The residue was transferred to crucibles, weighed, dried an in the oven overnight at 105ºC, and then placed in a muffle furnace at 600 ºC for 3 hrs. The loss in weight after ignition represents the crude fiber in the sample (AOAC 2005).

$$\% \text{ Fiber Content} = \frac{\text{Loss of Wt on ignition}}{\text{Initial Wt. of Sample}} \times 100$$

Energy Value: The energy value (Calorific value) is quantified using an indirect calculation method. By using specific values for the Atwater factor of Proteins, fats, and total Carbohydrates, one gram of the three types of nutrients that provide energy to the body can be calculated.

$$\text{Energy value} = \frac{(P \text{ x } 16.76) + (\text{F x } 37.71) + (\text{C x } 15.71) \text{ in KJ}}{100\text{g of sample}}$$

Where; P = Protein content (%), F = Fat content (%), C = Available total Carbohydrate (%)

Evaluation of Organoleptic Properties of Herbal Tea: The sensory test was performed by 8 panelists. A sensory evaluation sheet was designed and developed. The sensory attributes of Herbal tea were collected under the following groups such as appearance, color, Taste, Appearance, and overall acceptability. Four Herbal tea samples were prepared with different proportions T_0, T_1, T_2, and T_3, and were evaluated by the panelists using a 9-point hedonic scale (9 – like extremely, 8 – like very much, 7 – like moderately, 6 – like

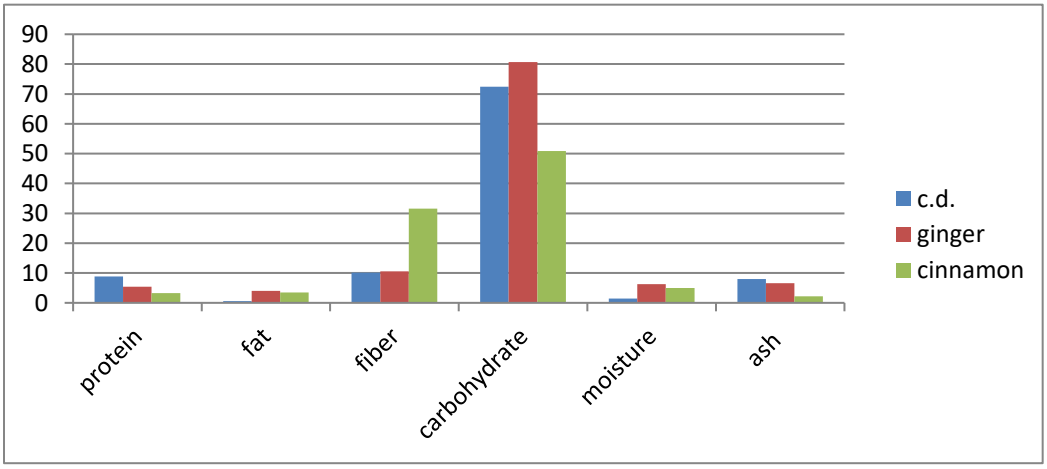
slightly, 5 – neither like nor dislike, 4 – dislike slightly, 3 – dislike moderately, 2 – dislike very much and 1 – dislike extremely). The sample T_2 is an extremely liked Herbal tea product by a sensory panelist.

Result & Discussion

The data obtained from proximate analysis of raw materials and Herbal tea are given in table no. 2. A sensory evaluation was conducted to determine which sample is good in overall acceptability from T_0, T_1, T_2, and T_3. T_2 has been selected for final product development due to its good taste, color, flavor, and overall acceptability. The product was found to be economically feasible as compared to the market sample as it cost Rs.495.08/- per/kg shown in table no. 2

Table No. 2. Proximate analysis of raw materials

Sr. No.	Proximate Analysis	*Cordia dichotoma*(%)	Ginger (%)	Cinnamon (%)
1	Protein	8.86	5.45	3.22
2	Fat	0.57	4	3.44
3	Fiber	10.17	10.60	31.57
4	Carbohydrate	72.47	80.67	50.89
5	Moisture	1.4	6.3	5
6	Ash	7.93	6.57	2.20

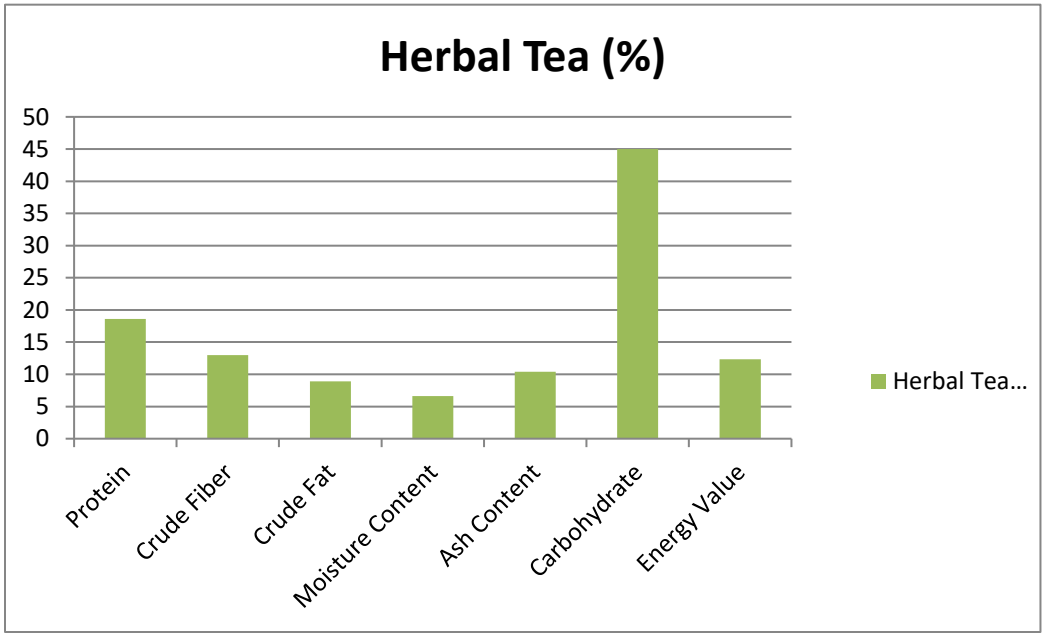


Cordia dichotoma contain Protein and fat 8.86% and 0.5% respectively. The Fiber and Carbohydrate present in *Cordia dichotoma* is 10.17% and 72.47% respectively. Moisture and Ash percentage of *Cordia dichotoma* is 1.4% and 7.93% respectively. Ginger having 5.45% Protein. The fat and Fiber content was found to be 4% and 10.60% respectively. It is evident from table that Carbohydrate and moisture content of Ginger is 80.67% and

6.3% respectively.The Cinnamon contain Protein and fat that is 3.22% and 3.44% respectively. The Fiber and Carbohydrate present in Cinnamon is 31.57% and 50.89% respectively and moisture percentage of Cinnamon is 5%.

Table No. 3. Proximate composition of Herbal Tea

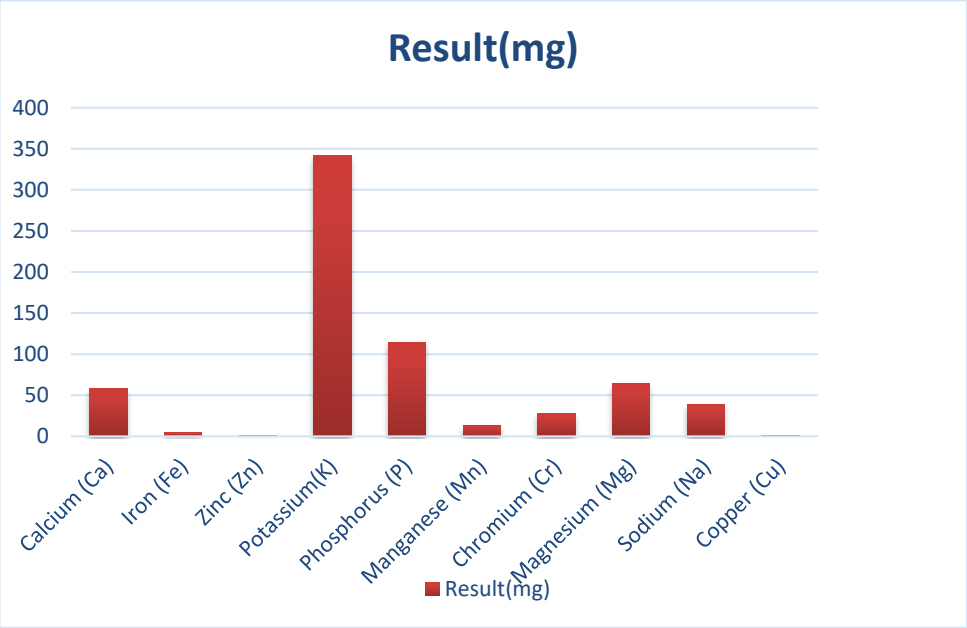
Sr.No.	Proximate Analysis	Herbal tea (%)
1	Crude Protein	18.59
2	Crude Fiber	13
3	Crude fat	8.9
4	Moisture content	6.6
5	Ash content	10.4
6	Carbohydrate	45
7	Energy value	12.36



The result of the proximate analysis of Herbal tea is reported in Table No 3. Which shows the percentage of Protein, Fiber, Fat, Moisture, Ash, Carbohydrate, and Energy value 18.59, 13, 8.9, 6.6, 10.4, 45, and 12.36 respectively.

Table No. 4. Mineral content of herbal tea

Sr. no	Minerals	Result (mg)
1	Calcium (Ca)	57.76
2	Iron (Fe)	4.5
3	Zinc (Zn)	1.6
4	Potassium(K)	342.2
5	Phosphorus (P)	114.7
6	Manganese (Mn)	13.66
7	Chromium (Cr)	27.99
8	Magnesium (Mg)	64.25
9	Sodium (Na)	39
10	Copper (Cu)	0.54



Each value is an average of three determinations. The individual ingredients like C.D. leaves and fruit, Ginger, Cinnamon formulated together as one mixture when analyzed according to the mineral analysis using analytical methods the following values were calculated. Herbal tea contain high amount of minerals which is calcium, iron, zinc, potassium, phosphorus, manganese, chromium, magnesium, sodium and copper is 57.76, 4.5, 1.6, 342.2, 114.7, 13.66, 27.99, 64.25, 39, 0.54 respectively.

Conclusion

The present investigation focuses on the development of Herbal tea with the incorporation of *Cordia dichotoma.* Which imposes potential health benefits of Ginger and Cinnamon. The method of developing Herbal tea was standardized and formulated. Four trial samples were prepared, from which T_2 sample with 50% *Cordia dichotoma* leaves, 15% fruit, Cinnamon 15%, Ginger 20% was found to be most appropriate. Then the prepared Herbal tea was analyzed for physical, mineral, and techno-economical characteristics. It was then stored at room temperature in plastic jar of 100gm. The developed Herbal tea can be one of the upcoming health beverages. Expanding the trend of RTS, the issues of Covid-19, diabetics, ostioporosis, ulter have created a growing demand for Herbal teas. As a substitute to milk tea. Lactose intolerants can also have the tea. Hence, it is finally concluded that developed processing technology for the preparation of Herbal tea with the incorporation of *Cordia dichotoma* is techno-economically viable and therefore can be commercially exploited. Moreover, it will be beneficial to the end user by having nutritional and therapeutic value with added benefits of Ginger and Cinnamon.

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