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Assessment of nutritional value of a newly formulated health drink

Keshaav Krishnaa P, Vishnu Priya V*, Gayathri R

Department of Biochemistry, Saveetha Dental College, Saveetha Institute of Medical and Technical Sciences, Saveetha University, Velappanchavadi, Chennai - 600077, Tamil Nadu, India

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ABSTRACT

To estimate the nutritional value of a newly formulated health drink. The various components were weighed out and grinded to fine homogenous powder. The various components include turmeric, black pepper, mango peel, raisins and almonds. Mango peel and mango fruit were dried to remove the water content. The sample tea powder was prepared by weighing out 10g of whole black pepper, 18g of almonds, 15g of raisins, 10g of dried and powdered mango peel and fruit along with about 1g of turmeric powder. The above said weight of different substances was obtained through trial and error. The above said mixture was then quantitatively analysed for nutritional substances such as carbohydrates, protein, fat, calcium and dietary fibres. The health drink was quantitatively analysed and the values were obtained for 100g of the health drink. The carbohydrate content was lower in comparison with commercially available health drinks available in the market, this would provide an edge of the said health drink as a lower carbohydrate content implies a lesser chance of dental caries. The newly formulated health drink provides to be far superior to the presently available health drinks and hence further research on the same would enable its introduction into the commercial market for use.



* Corresponding Author

Name: Dr. Vishnu Priya V
Phone: +91-9841445599
Email: drvishnupriyav@gmail.com

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INTRODUCTION

Initially the composition of tea was studied and the effect of each compound was observed. On referring a few articles it was found that tea is majorly composed of Polyphenolic compounds. Majorly among the polyphenolic compounds were flavonoids. Within flavonoids the major one was tannins (Penelope Ody, 2000). Tannins on oxidation produced the aflavins and thearubigins which were responsible for the dark colour and

robust flavour of tea. Other major flavonoids that were present were Catechin, epicatechin, epicatechin gallate, gallic acid (Which is not present in green tea), epigallocatechin gallate (EGCG) (Knop *et al.*, 2015). EGCG is present in higher levels in green tea in comparison with that of normal tea. EGCG is the compound that is majorly responsible for the amazing properties of green tea. It is responsible for the anticancerous property (Havsteen, 2002). The compound which causes weight loss etc. Amino acids that are present in tea are majorly responsible for the brothiness and umami taste of green tea. Out of which the major amino acid present is L-Theanine. L-theanine is responsible for that feeling of relaxation that we get when we drink tea. It also promotes brain activity. The enzymes that are present in tea include polyphenol oxidase and peroxidase which are responsible for the browning of tea leaves (Feng, 2006). Heat inhibits these enzymes that is why the green tea leaves remain green. They contain the pigments, chlorophyll m, carotenoids and xanthophylls. Carbohydrates account for about 11% which is for the sweetness.

It contains methylxanthines such as caffeine which is a stimulant, theobromine and theophylline. Minerals present include Fluorine, Manganese, Arsenic, nickel, selenium, iodine, aluminium and potassium.

Many health drinks are available in the commercial market, but only very few of them are likeable by a human being. The field has grown vastly yet many side effects exist from various health drinks. Health drinks should have multiple beneficial properties but no negative properties at the same time. Thus the study was designed to create a health drink and to assess the nutritive value of the same before leading to further investigations.

MATERIALS AND METHODS

Formulation of health drink

The various components that were taken as part of the health drink are:

- 1) Turmeric
- 2) Black pepper
- 3) Mango peel and fruit
- 4) Raisins
- 5) Almonds.

The various components were weighed out and titrated with a mixer grinder to a fine homogenous powder. Mango peel and Mango fruit were dried to remove the water content. The sample tea powder was prepared by weighing out 10g of whole black pepper, 18g of Almonds, 15g of Raisins, 10g of dried and powdered mango peel and fruit along with about 1g of Turmeric powder. The above said weight of different substances was obtained through trial and error. The above mentioned ingredients were taken in a measured quantity and the resulting mixture was tested for the carbohydrate content, protein content and other quantitative measures. These norms would suggest a better knowledge about the newly formulated health drink.

Nutritive analysis

Analysis of carbohydrate

Nutritive databases may provide values for total carbohydrate or for available carbohydrate. Total carbohydrate values in the tables are calculated by difference using the following formula for 100g of food. Carbohydrate = 100g - (g protein + g fat + g alcohol + g ash + g water)

Carbohydrate calculated in this manner includes dietary fibre as well as other components of a food that are non protein, fat, alcohol, ash or water.

Determination of crude protein

Ten grams of the sample was weighed and transferred into a Kjeldahl flask. Four tablets of

Kjedahl catalysts (Tablet consists of 1g Na₂SO₄ and 0.5g of selenium) were added. Concentrated H₂SO₄ (20ml) and glass beads were added to avoid any bumping on heating. The flask was set in the fume cupboard and heated gently until the mixture becomes colourless. The heating process was approximately one hour after which it was allowed to Cool down to room temperature slowly and washed. 20ml of distilled water is then added into 500ml distillation flask.

Distillation

Pieces of hot cleats were added into the flask and connected up to the splash head and water cooled condenser. NaOH solution (5%, 4ml) was added in the dropping funnel and 50ml of 2% boric acid into the 250ml receiving flask with methyl red indicator. The dropping funnel tap was opened slowly to allow the NaOH to enter the boiling flask. The distillation flask was heated to boiling with water passing through the condenser. Distillation continues until about 150ml was collected in the receiving flask. The content of the flask was titrated with 0.5 M HCl until pink end point. The reading was recorded and blank was run along the same treatment.

Determination of fat/oil

Ten grams of weighed sample was transferred into thimbles of a Soxhlet extractor containing 250 ml of petroleum ether. The thimble and the contents were placed in a 100ml beaker and dried in an oven for 30 minutes at 105-110°C to expel traces of moisture. The beaker was rinsed with the extractant and added to the Soxhlet extractor. The sample was extracted for 7 hours at a condensation rate of 240 drops per minute. After the extraction the sample was transferred to an already weighed evaporating dish and rinsed 2-3 times with the extractant. The dish was placed in a fume chamber to cause solvent to evaporate. The sample was dried in an oven for an hour at 105 degrees to 110 degrees and then cooled in a desiccator and weighed.

The percentage Oil weight was calculated as:

$$\begin{aligned} & \% \text{ crude fat} \\ & = (\text{weight of dish} + \text{contents after drying} \\ & \quad - \text{weight of empty evaporating dish}) \\ & \quad / (\text{Weight of sample taken for analysis}) \times 100 \end{aligned}$$

Determination of fiber content

Two grams of the ground sample was weighed and placed in a conical flask. The sample was extracted by stirring with petroleum ether. 200ml of 1.25% H₂SO₄ solution was heated to boiling and transferred to the dried sample. The sample was then allowed to settle. The flask was connected to a water cooled reflux condenser and heated. The

flask was boiled gently for 30 minutes and mixed. The flask was removed and filtered using a filter paper held in the funnel and washed with boiling water until no longer acidic to litmus paper. 200 ml of 1.25% NaOH was brought to boiling under a reflux condenser. The alkaline solution was used to wash the sample back into the initial flask and then boiled for 30 minutes under condenser. Again, the flask was removed and immediately filtered. All the insoluble matter was then transferred to the sintered crucible using boiling water. The residue was washed first with boiling water, 1% HCl and boiling water to render the insoluble matter free of acid. The residue was washed three times with alcohol and diethylether and then dried in an oven at 150 degrees to a constant weight. The dried sample was also ashes by incineration in a muffle furnace at 560 degrees for an hour. The crucible was cooled in desiccators and then weighed.

$$\% \text{ crude fat} = \frac{(\text{weight of insoluble matter} - \text{matter of ash})}{(\text{Weight of sample})} \times 100$$

Determination of calcium

The sample was placed in an atomic photometer and the results were obtained from the same apparatus.

RESULTS AND DISCUSSION

The newly formulated health drink was tested through the above said methods and the nutritive value was calculated which was presented in Table 1. 1g of black tea contains about 22 to 28mg of caffeine whereas 1g of green tea contains about 11 to 20mg of caffeine. A clinical study which was conducted had two groups; each group was given tea for 12 weeks. The tea of group A had 690mg of catechism whereas that of group B had only 22mg of catechins. After 12 weeks the weight loss was checked and the lipoproteins were checked. The weight loss was more in group A than in group B, and the decrease in lipoproteins was more in group A than in group B.

For the prevention and treatment of oral diseases the following properties are required:

- 1) Promotes saliva flow as the buffer action of saliva would increase the pH
- 2) Decrease the acidity
- 3) Destroys the microbial biofilm
- 4) Prevents the adherence and proliferation of *S. mutans* which is one of the main causative organisms for caries.
- 5) Increased fluoride content as it prevents caries

- 6) There should be minimal or no sucrose as it is principal for causing caries when compared to glucose and fructose.

Keeping all these qualities in mind and also trying to add more health benefits the following compounds were chosen:

- 1) Turmeric
- 2) Black pepper
- 3) Mango peel and fruit
- 4) Raisins
- 5) Almonds.

The reasons as to why these compounds were chosen and their nutritional effects are given below:

Turmeric

Various studies have said that turmeric prevents the adherence of *S. Mutans* on to the tooth surface (Ping Hua *et al.*, 2013). It also increases the quality of skin and has various medicinal properties. It has anti inflammatory, antifungal and anti bacterial properties. The main component focussed here is curcumin which is nothing but diarylheptanoid. It is insoluble in water. The solubility of curcumin is increased by 200% in the presence of piperene (Joe *et al.*, 2004). Other volatile compounds include tumerone which is said to cure Alzheimer's. Curcumin also decreases diabetes and blood pressure (Chattopadhyay *et al.*, 2004). Turmeric also consists of Altatone and Zingiberene. Turmeric aids in the treatment and also in management of various dental procedures (McNamara *et al.*, 2005, Nivetha *et al.*, 2014, Nida fathima, 2014, Shreeram *et al.*, 2015).

Black pepper

Black pepper consists of piperene (Chen *et al.*, 2006), which increases the absorption of curcumin (Bhutani *et al.*, 2009). It also consists of amides, piperidines, iron, manganese and vitamin K. White pepper has more quantity of piperene than that of black pepper (Shoba *et al.*, 1998).

Mango peel and fruit

Mango can also be used in the form of Vimang. Vimang is an aqueous bark extract of mango. Mango peel consists of carotenoids, B-carotene (which help in vit A syn), Gallic acid, alpha carotene, caffeine acid, lutein, catechism and tannins. It also contains mangiferin which is exclusive in mangoes.

Raisin

Raisins or dried grapes consist of 156 mcg of fluorine in 100g. Thus it would help to prevent

caries formation. It consists of 72% carbohydrates out of which 30% are fructose and 28% is glucose. Thus it would make the drink tasty as well. They also contain about 3% protein and 3.7%–6.8% dietary fiber. Raisins help to decrease the blood pressure as well (Friedrich *et al.*, 1989). According to studies, raisins interfere with the proliferation of *S. Mutans*. To add to all, these benefits it also helps in detoxification when soaked in water.

Almonds

Almonds contain L-Theanine (Albert Julius Winkler, 1962, Bays *et al.*, 2012). This helps to reduce stress and also helps to offer proper sleep and prevent sleeping in the day. This also provides the feeling of relaxation (Mandalari *et al.*, 2008, Berryman *et al.*, 2011).

Comparison with presently available health drinks

Carbohydrate level

For the purpose of better oral health and systemic health it has been observed that a lower carbohydrate level is required. The Carbohydrate levels of commercially available health drinks have higher carbohydrate level. The newly formulated health drink has carbohydrate level lower than both of the above stated drinks. Thus, this drink fulfils the criteria of lower carbohydrate level.

Protein level

Protein levels of commercially available health drinks have protein levels considerable higher than the present formulated health drink. But this factor doesn't not influence the Aimee outcomes of the present health drink. The protein level of the health drink can be increased in further formulations.

Fat level

The fat level of the newly formulated health drink is 2.53g which is a moderate level. Thus it has an ideal level of fat which will provide beneficial for the health drink. The amount of fiber Content is considerably higher and hence it would help in digestion and other dietary functions.

Table 1: Nutritional levels of health drink

S. No	Constituent of Health Drink	Value
1.	Carbohydrate	72.3g
2.	Protein	5.7g
3.	Fat	2.53g
4.	Fiber content	2.1%
5.	Calcium	205 micro grams

CONCLUSION

The newly formulated health drink provides to be far superior to the presently available health drinks and hence further research on the same would enable its introduction into the commercial market for use.

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