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Formulation of a herbal bar with muskmelon and sunflower seed

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Abstract

Herbs (*Azadirachta indica* and *Bacopa monnieri*) have a wide range of therapeutic properties as they are rich source of antioxidants. Seeds contains high amount of protein, fiber, vitamin (A, B, C, E) and minerals (calcium, magnesium, potassium, zinc, iron, selenium and manganese). These herbs are generally not consumed as such because of its bitter taste, therefore a herbal chocolate bar is formulated which is incorporated with these herbs, seeds and dates in it. The chocolate sample were prepared using chocolate and dates in ratio (HC1= 90:10, HC2=80:20, HC3=70:30) and herbs *Azadirachta indica* and *Bacopa monnieri* (0.5g) and muskmelon seeds and sunflower seeds (3g). The chocolate with herbs was approved by the sensory panel. All the samples showed an index of acceptance above 70%. Sensory acceptability of treatment HC3 was found best for all attributes. The protein content was highest in HC1, the moisture content was highest in HC3, the fat content was highest in HC1, the ash content was highest in HC3 and the carbohydrate content was highest in HC3. The chocolate prepared contains benefits of herbs, seeds and dates which increases the nutritional value of the chocolate and can be consumer by people of any age group.

Keywords: Herbs, therapeutic, antioxidant

Introduction

A chocolate bar is a sugary treat which is generally elliptical or rectangular in structure and is recognized from pastilles, truffles and bonbons. It generally refers to a snack-sized measured bar covered with or comprising of chocolate alongside different ingredients.

Chocolate is a regularly sweet, normally dark colored, food preparation of roasted and ground cacao seeds. It is produced using the cocoa beans that is acquired from the product of *Theobroma cacao*, a cocoa tree. In entire beans, 50-57% of the dry weight is lipid, or cocoa butter. The staying fat free mass is about 20% protein, 16% starch, 26% fiber, 5% ash, and 33% different elements^[1]. Chocolate is made in the form of a liquid, paste, or in a block, or used as a seasoning ingredient in other foods. The seeds of the cacao tree have an extraordinary harsh taste and should be matured to build up the flavor. After maturation, the beans are dried, cleaned, and simmered. The shell is evacuated to create cacao nibs, which are then ground to cocoa mass, unadulterated chocolate in rough form. When the cocoa mass is melted by warming, it is called chocolate liquor. The liquor likewise might be cooled and prepared into its two segments: cocoa solids and cocoa butter. Fine chocolate falls into three categories: dark chocolate, milk chocolate and white chocolate.

- Dark chocolate has chocolate liquor, cocoa butter, lecithin, sugar and vanilla.
- Milk chocolate has majority of the above ingredients in addition to milk fats and milk solids.
- White chocolate contains everything milk chocolate does excluding chocolate liquor.

Ongoing advances in explanatory approach have revealed that dark chocolate, a fruit of plant (*Theobroma cacao*), is a rich wellspring of flavonoids^[2]. 100 gm of dark chocolate contains 67% of the RDI for iron, 58% of the RDI for magnesium, 89% of the RDI for copper, 98% of the RDI for manganese, 11 gm of fiber. It additionally has a lot of potassium, phosphorus, zinc and selenium. It is high in antioxidants, consequently shields our skin from free radical damage. Dark chocolate raises great cholesterol and brings down bad cholesterol.

Herbs are plants with appetizing or sweet smelling properties that are utilized for seasoning and embellishing nourishment, therapeutic purpose, or for scents; barring vegetables and different plants, consumed for macronutrients. Neem (*Azadirachta indica*) has been widely utilized in Ayurveda, Unani and Homeopathic prescription and has turned into a cynosure of current drug. More than 140 compounds have been segregated from various parts of neem.

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All parts of the neem tree have been utilized generally for the treatment of aggravation, contaminations, fever, skin illnesses and dental issue. The therapeutic utilities have been depicted particularly for neem leaf. Neem leaf and its constituents have been shown to display immunomodulatory, calming, antihyperglycaemic, antiulcer, antimalarial, antifungal, antibacterial, antiviral, cancer prevention agent, antimutagenic and anticarcinogenic properties. This audit condenses the wide scope of pharmacological exercises of neem leaf.

Brahmi (*Bacopa monnieri*), a herb that can be found at heights from ocean level to elevations of 4,400 feet, and is effectively developed if sufficient water is accessible. Blooms and organic product show up in summer and the whole plant is utilized therapeutically [3]. It standouts amongst the most dominant mind tonics in the ayurvedic pharmacist. The leaf of the plant resembles the cerebellum and is generally used to advance memory and insight and to loosen up the focal sensory system. Brahmi underpins tranquil rest, calms emotional turbulence, and at the same time improves focus and sharpnes. Brahmi bolsters sound skin, lymph, circulatory capacities. This herb maintains the inner skin that covers the digestive tract where healthy skin aids healthy microbes; which makes neuro transmitters that support healthy and stable mental state and cerebral function. Brahmi is well-known to support the body’s usual healing process and healthy blood flow [4].

Seeds contains high level of monounsaturated fats, polyunsaturated fats, antioxidants, vitamins and minerals such as calcium, magnesium, potassium, zinc, selenium, manganese, iron. They are rich source of fiber. Musk melons are a powerhouse of wellbeing; they are stacked with such a significant number of supplements that they nearly appear the superhero of organic products. Lipid and protein contents (on dry weight basis) is 37 and 54%, respectively, for seed kernels of sweet melon assortments of Cucumis melo [5]. Muskmelons are wealthy in potassium which helps in directing the circulatory strain and keeps hypertension under control. Muskmelons help manage the glucose levels which helps in controlling diabetes. They are totally cholesterol free and consequently can be had with no stress. Musk melons are overly wealthy in vitamin C.

Sunflower seeds can diminish the danger of coronary illness, battle against malignancy, improve thyroid capacity and keep glucose relentless. About 46 grams of sunflower seeds contains 269 calories, 9.2 grams carbohydrates, 9.6 grams

protein, 23.7 grams fat, 4 grams dietary fiber, 15.3 milligrams vitamin E (76% of DV), 0.7 milligram thiamine (45% of DV), 0.9 milligram manganese (45% of DV), 0.8 milligram copper (41% of DV), 150 milligrams magnesium (37% of DV), 24.4 micrograms selenium (35% of DV), 0.6 milligram vitamin B6 (31% of DV), 304 milligrams phosphorus (30% of DV), 104 micrograms folate (26% of DV), 3.8 milligrams niacin (19% of DV), 2.3 milligrams zinc (15% of DV), 2.4 milligrams iron (13% of DV), 0.2 milligram riboflavin (10% of DV), 297 milligrams potassium (8% of DV), 0.5 milligram pantothenic acid (5% of DV).

Dates contain a lot of dietary fiber, and are believed to be a decent wellspring of certain minerals, e.g., iron, potassium, and calcium. The functional constituents of dates incorporate dietary fiber, which is essential for the wellbeing of the stomach related tract. It is conceivable that dates may likewise contain valuable amounts of antioxidants. Antioxidants are thought to assume a basic job in the counteractive action of cardiovascular infection [6], cancers [7], neurodegenerative maladies, such as Parkinson’s and Ahlzheimer’s diseases, as well as soreness [8]. A dietary antioxidant is characterized as a substance in nourishments that essentially diminishes the unfavorable impacts of responsive species, for example, receptive oxygen and nitrogen, on ordinary physiological capacity in people. Antioxidants notably delay or avoid oxidation of the substrate when they are available in foods or in the body at low focuses [9-10]. Natural antioxidants comprise principally of plantphenolics, nutrient C, carotenoids, and selenium [11].

Materials and methods

Procurement of Raw Materials

Herbal confection is prepared in the Advanced Food Technology laboratory, Department of Food Technology, Uttaranchal College of Applied and Life Sciences, Uttaranchal University, Dehradun. Raw materials such as dates, dark chocolate, melon seed, sunflower seeds and herbs (Brahmi and Neem) was purchased from the local market of Premnagar, Dehradun, Uttarakhand.

Methodology

Preparation of Herbal Confection

Herbal confection is prepared in the laboratory using different combinations of the ingredients as depicted in Table 1.1

Table 1: Treatment Combination

S. No.	Sample	Chocolate	Neem	Brahmi	Dates	Sunflower seeds	Musk melon seeds
1.	T0	100g	-	-	-	-	-
2.	HC1	90g	0.5g	0.5g	10g	3g	3g
3.	HC2	80g	0.5g	0.5g	20g	3g	3g
4.	HC3	70g	0.5g	0.5g	30g	3g	3g

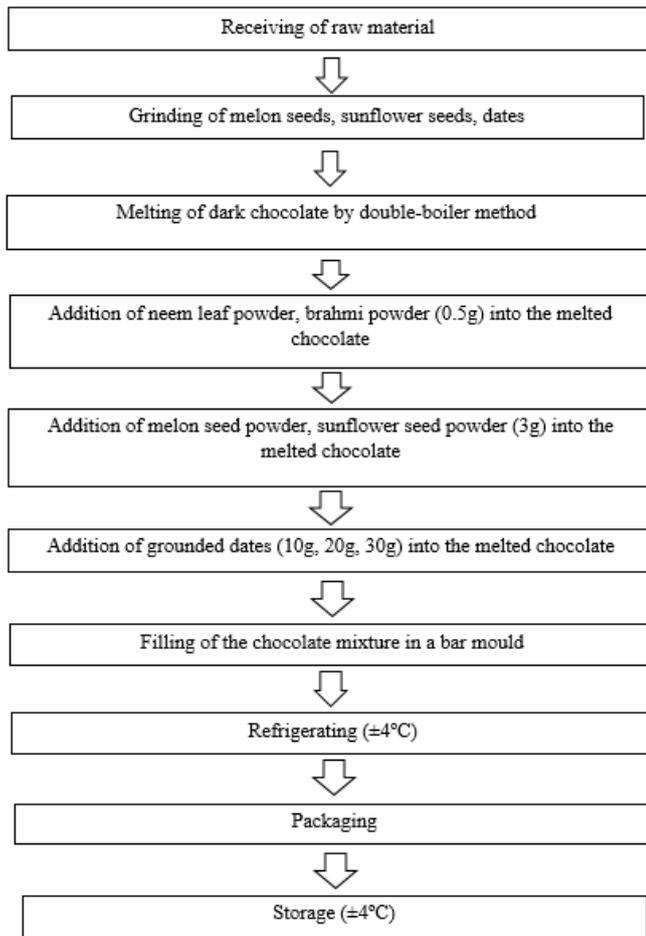


Fig 1: Flowchart for preparation of herbal confection

Proximate Analysis of Herbal Bar

Moisture content

Moisture content was determined by the standard method of Rangna (1986). The moisture content is defined as the amount of water present in food sample. For determining the moisture content in the sample, dry empty petri dish is weighed and then 2 g of sample is added to it and it is kept in hot air oven at 110° C for 2-3 hours. After the given time the petri dish are kept in the desiccator to cool down and the weight is taken using weighing balance. Calculation is done by the formula:

$$\text{Moisture Content (\%)} = \frac{W_2 - W_3}{W} \times 100$$

Where,

W = weight of sample (g)

W₂ = weight of empty petri dish (g) + sample (g)

W₃ = weight of the petri dish after drying (g)

Ash content

Ash content was determined by the standard method of Rangna (1986). The ash content is defined as the amount of fiber, vitamins and minerals present in food sample. For determining the ash content, take the weight of empty crucible and put 2 g of sample in it. Put the crucible on heating mantle and churn it until white smoke stops coming. Put the churned crucible in muffle furnace at 550° C for 4-5 hours. After the given time the crucible is placed in desiccator for cooling the crucible and weigh the crucible using weighing machine. Ash

content is calculated by the formula:

$$\text{Ash Content (\%)} = \frac{W_3 - W_2}{W} \times 100$$

Where,

W = weight of sample (g)

W₂ = weight of the empty crucible (g)

W₃ = weight of the crucible after ashing (g)

Fat content

Fat content of food is determined using soxhlet extraction method (AOAC, 1984). 2g of oven dried sample was taken in the thimble and plugged with fat free cotton. Then the thimble was dropped in fat extraction tube of soxhlet apparatus. It was attached to the bottom of the extraction tube to a soxhlet flask. Approximately 70ml of petroleum ether was poured through sample in the tube into flask and as attached to soxhlet apparatus. After the extraction solvent is evaporated on hot plate. After cooling the flask containing fat was weighed.

Fat content (%) =

$$\frac{\text{Weight of sample after drying} - \text{weight of empty cup}}{\text{weight of sample taken}} \times 100$$

Protein content

Protein content was determined by Kjeldahl method as described by Horwitz (1980). Accurately weighed sample (0.5 g) was transferred into 800 ml digestion flask. To this 25ml of concentrated H₂SO₄ and 10g digestion mixture (consisting of copper and potassium sulphate, 1: 10 w/w) was added and preceded for digestion. The mixture was digested over flame till it became transparent. Mixture was allowed to cool, diluted with 200ml distilled water and neutralized with approximately 80ml of 50% w/v sodium hydroxide solution. The mixture was distilled and the distillate collected in a conical flask containing 50 ml of saturated boric acid solution and 1 drop of mixed indicator (equal volume of saturated solution of methyl red in ethanol and 0.1% solution of methyl blue in ethanol). About 150 ml of the distillate was collected and then titrated against 0.1 N H₂SO₄.

Calculation of protein content:

$$\text{Total nitrogen (\% w/w)} = \frac{V}{W} \times 0.14$$

Where,

V = Volume of 0.1 N H₂SO₄ required for titration

W = Weight in g of the sample

Protein (% w/w) = Total nitrogen (%) X 6.25

Carbohydrate determination

The total carbohydrate is determined by 100 - (Moisture+ protein + fat + ash)

Sensory Evaluation

The samples were evaluated by 10 panelist drawn from Department of Food Technology, UCALS, Uttaranchal University on the basis of body & texture, colour & appearance, aroma & flavour, and overall acceptability using 9-point hedonic scale as mentioned in Table 1.2.

Table 2: Sensory analysis by 9-point hedonic scale

Hedonic Score Point	Evaluation
9	Like extremely
8	Like very much
7	Like moderately
6	Like slightly
5	Neither like or dislike
4	Dislike slightly
3	Dislike moderately
2	Dislike very much
1	Dislike extremely

Results and discussion

In the present study, four formulations of the samples were estimated (T0, HC1, HC2, HC3) for Moisture, Protein, Fat, Ash, Carbohydrate. The moisture content of control sample (T0), HC1, HC2, HC3 is 0.78%, 7.1%, 7.32%, 7.75% respectively. The moisture content is increasing in the

samples due to the increasing quantity of dates in them as dates have higher amount of moisture in them. The fat content of T0 is 26.8%, HC1 is 29.5%, HC2 is 28.3%, HC3 is 27.1%. The fat content is decreasing gradually because of the decrease in the amount of chocolate in sample HC2 followed by HC3. The protein content of T0, HC1, HC2, HC3 is 3.5%, 3.21%, 2.96%, 2.71% respectively. The protein content is higher in HC1 due to more quantity of chocolate in it followed by HC2 & HC3 which has least amount of chocolate. The ash content in T0, HC1, HC2, HC3 is 1.4%, 1.2%, 1.4%, 1.6% respectively. The ash content is increasing because of the increasing quantity of dates in the sample and dates comprises of significant quantities of minerals. The carbohydrate content in T0, HC1, HC2, HC3 is 67.52%, 58.99%, 60.02%, 60.84%. The carbohydrate content is increasing in the samples because dates have higher amount of carbohydrates in them and the ratio of dates in HC3 is higher than HC2 followed by HC1.

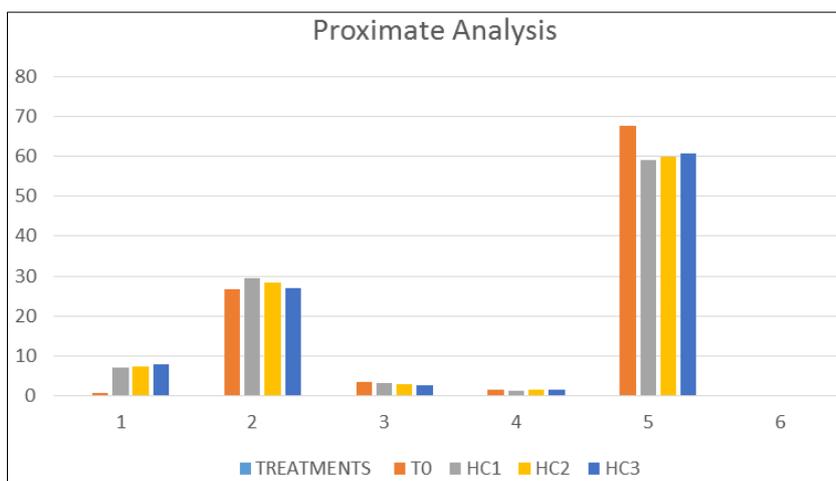


Fig 2: Proximate analysis of Herbal Chocolate

Sensory Analysis

Sensory evaluation of chocolate sample was done using 9-

point hedonic rating scale. The average data of all the samples is as follows:

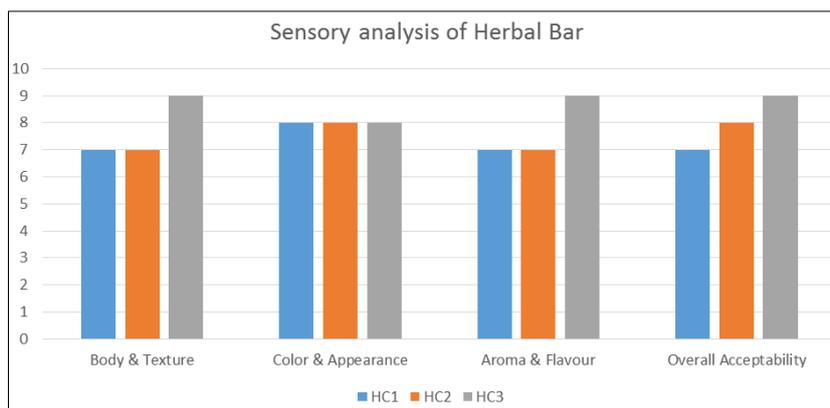


Fig 3: Sensory analysis of Herbal Bar

Conclusion

The herbal chocolate formulated in this study can be used as a cognitive enhancer. Neem and Brahmi being bitter cannot be consumed directly, therefore these ingredients have been incorporated in the chocolate to ease in consumption. The seeds and dates present in the chocolate are rich source of protein and minerals which enhance the nutritive value of the chocolate.

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