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Formulation and Evaluation of Multivitamin and Antioxidant Herbal Chocolate

Sonali A. Gore[1], Ushaka S. Harkal[2], Pranavi P. Gitte[3], Vaibhav N. Jadhav[4], Vedant B. Munde[5]
Dayanand Institute Of Pharmacy, Latur, Maharashtra, India.

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ABSTRACT
The Chocolate is most loving food among the people. It is an easiest form to chew and absorb for every individual. "The aim of the present study was Formulation and evaluation of multivitamin and antioxidant herbal chocolate" containing herbal ingredients like " Ocimum sanctum (Tulsi), Zeylanicum cinnamomum (Cinnamon), Elettaria cardamomum (Cardamom), Moringa oleifera, Beta vulgaris (Beet root), Saccharum officinarum (Jaggery), The obroma cacao (Dark chocolate), are the herbs and also contain other medicinal properties like Antioxidant and Multivitamin.

Keywords: Herbal chocolate, Multivitamin , antioxidant

I. INTRODUCTION:

One of the finest delivery methods for patient compliance is oral. It offers advantages of its own. Chocolate is an incredibly sophisticated and adaptable delicacy that can be mixed to produce unique tastes and textures. Chocolate is resistant to microbial growth and the hydrolysis of active ingredients that are water-sensitive because it is anhydrous. In many ways, using chocolate as a delivery system for active compounds makes sense. Chocolate is adaptable food that can be combined to create completely different taste and texture sensations.[1]

The primary objective of this research was to create and assess nutrition chocolate that contains a natural cardiac tonic. Our memories are essential to our individuality; even when it comes to situations we have experienced together, no two people's memories are exactly the same. Herbal formulations consist of one or more herbal preparations combined with an active ingredient, herbal preparation or herbal substance alone. Because of the health benefits of cocoa, chocolate-related products have been used as medicine for centuries in many cultures. Flavonoids, which function as antioxidants, lower blood pressure and balance specific hormones in the body, are largely responsible for these advantages. Compared to milk or white chocolate, which do not offer the same health benefits, dark chocolate has a significantly higher concentration of antioxidants.[2,3,4,5].

Chocolate is a culinary tool that can be used to create novel textures and flavors. Because chocolate is an anhydrous medium, it also withstands the growth of microorganisms and the hydrolysis of water-sensitive active ingredients. Chocolate contains a lot of different compounds, including sterols, saturated fat and polyphenols. To make medicated chocolate, you take a chocolate base and combine the drug with it. The process by which the drug is released from the chocolate after being integrated into it is referred to as the 'chocolate drug delivery system'. This is the most effective way to give drugs to children. The current study set out to create a herbal chocolate that is cardiotonic. In addition, to assess the prepared formulations physiochemical parameters in order to standardize and commercialize them. .Herbal formulation means a dosage form consisting of one or more herb or proceed herbs in specified quantities to provide specific nutritional, cosmetic benefits meant for use to diagnose,treat,mitigate.[6,7,8]. In many ways,chocolate is an excellent vehicle for delivering active chemicals.The aim of the present study to prepare study to prepare herbal chocolate for antioxidant, and as a Multivitamin.

Vitamins and Oxidative Stress

The knowledge of free radicals and reactive oxygen species (ROS) in biology has given

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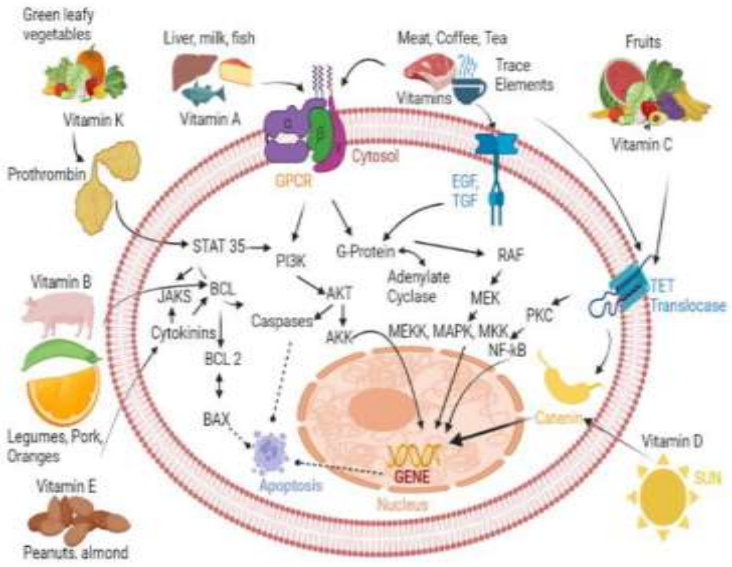
a new understanding of the pathogenesis of diseases, and it promises new insights into health and disease management [9]. Free radicals are any molecular species that contains an unpaired electron in an atomic orbital. The presence of unpaired electron results in specific common properties that are shared by most radicals [10]. Many chemical species are unstable and highly reactive; they can either donate an electron to another molecule or accept an electron from other molecules, therefore behaving as oxidants or reducing agents [11]. The most critical oxygen-containing free radicals in many disease states are hydroxyl, superoxide anion, hydrogen peroxide, oxygen singlet, hypochlorite, nitric oxide radical, peroxynitrite radicals [12], these are highly reactive species in the nucleus and in the membranes of cells capable of damaging biologically relevant molecules such as DNA, proteins, carbohydrates, and lipids [13]. Free radicals attack essential macromolecules leading to cell damage and homeostatic disruption. The formation of free radicals occurs continuously in the cells because of both enzymatic and non-enzymatic reactions. Enzymatic reactions serve as a source of free radicals, include those involved in the respiratory chain, phagocytosis, prostaglandin synthesis, and the cytochrome P-450 system [14]. Production of free radicals is in non enzymatic reactions of oxygen with organic compounds as well as those initiated by ionising reactions. Generation of free radicals in the body occurs in cellular structures like Mitochondria and Peroxisome. Processes like Xanthine oxidase, Inflammation, Phagocytosis, Arachidonate pathways, Exercise, Ischemia/reperfusion injury can also result in the production of free radicals [10]. Free radicals are generated externally from cigarette smoke, Environmental pollutants, Radiation, Pesticides, Industrial solvents, and Ozone .



Material and Methods

Material:

Moringa, Tulsi, Cinnamon, Cardamon, Jaggery, Beetroot, Dark Choco, Cocoa Butter.

Extraction:

Extraction of beetroot

Cold Extraction (CE)

Dried and ground material (20 g) and solvent (250 mL) were added into an conical flask. Various solutions were employed as the solvent—(CE 50% MeOH), 50% aqueous methanol (CE 80% MeOH), 50% aqueous ethanol (CE 50% EtOH) and water (CE H2O). To avoid constant stirring, magnetic grain was added to the mixture, and it was then placed on a magnetic stirrer. The extraction took place for about 2 h at room temperature.

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Method of preparation

To formulate herbal multivitamin antioxidant chocolate all ingredients are weighed appropriately according to formula.

↓

7 gm of Jaggery was weighed and 10 ml water was added to Jaggery powder.

↓

Jaggery powder solution was melted in a water bath by using the double boiler method.

↓

When the Jaggery solution was formed then weighed powdered herbal ingredients were added to the Jaggery solution.

↓

The powdered herbs are mixed homogeneously with Jaggery solution.

↓

Dark chocolate was weighed and melted in a water bath by using the double boiler method

Table 1: compositions formulations

Sr. no.	ingredients	Formulation code			
		F1	**F2**	**F3**	F4
1	Moringa powder	1	0.7	0.8	0.9
2	Tulsi powder	0.5	0.3	0.3	0.5
3	Cinnamon powder	0.02	0.02	0.02	0.02
4	Cardamon powder	0.005	0.005	0.005	0.005
5	jaggery powder	8	7	7	7
6	Beetroot powder	2	2	1	1
7	Dark choco	15	15	15	15
8	Cocoa butter	1	1	1	1

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Sr no.	ingredients	uses
1	Moringa powder	antioxidant
2	Beetroot powder	Healt boosting supplement
3	Tulsi powder	Improved immunity
4	Cinnamon powder	Powerhouse bof antioxidants
5	Cardmon powder	Improve blood circulation
6	choclate	Contain anti oxidants that can protect cells
7	jaggery	Detox the liver and blood

EVALUATION [15-18]

1. **Organoleptic characters.** These are Sensory properties. Those that can be detected by the sense organs. For foods, it is used particularly of the combination of taste, texture, and astringency and aroma (perceived in the nose)

2.pH- 2gm of prepared chocolate was dissolved in 100ml of phosphate buffer solution and pH of the resulted solution was studied by digital pH meter with glass electrode

3. **Phytochemical analysis**.

4. Hardness Hardness of chocolate was measured by Monsanto Hardness Tester.

5. **Blooming test Fat Bloom** - When the thin layer of fat crystals form on the surface of chocolate formulation. This will cause the chocolate to lose its gloss and a soft white layer will appear, giving the finished article an unappetizing look. Fat bloom is caused by the recrystallization of fat and/or a migration of a filling fat to the chocolate layer. Storage at a constant temperature will delay the appearance of fat bloom.

Sugar Bloom – This is rough and irregular layer on top of chocolate formulation. This is caused by condensation (when chocolate is taken out of the refrigerator). This moisture will dissolve the sugar in the chocolate. When the water evaporates, sugar recrystallizes into rough, irregular crystals on surface. This results into unpleasant look. Test sample of chocolate was subjected to treatment cycles at 30℃ for 11 hours Shifting of temperature for 1 hour to 18 ℃ for 11 hours shifting of temperature for 1 hour. Observed the test sample of chocolate whether blooming has taken place or not.

6. Physical stability To check the physical stability, sample of chocolate was kept in closed container for 1 month at 28℃ after one month interval, Test sample of chocolate was observed for physical appearance and drug degradation.

7. Moisture content 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

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oven at 110o C for 2-3 hours. After the given time the petri dish are kept in the desicator to cool down and the weight is taken using weighing balance. Calculation is done by the formula:
Moisture Content (%) = $W2- W3 /W \times 100$

Where,
W = weight of sample (g)
W2 = weight of empty petri dish (g) + sample (g)
W3 = weight of the petri dish after drying (g).

II. RESULT AND DISCUSSION

1. Organoleptic Properties

Sr.no.	parameters	observation			
		F1	F2	F3	F4
1	colour	brown	brown	brown	brown
2	odour	chocolaty	chocolaty	chocolaty	chocolaty
3	taste	Sweet and slightly bitter	Sweet and slightly bitter	Sweet and slightly bitter	Sweet and slightly bitter
4	Mouth feel	Smooth and pleasant	Smooth and pleasant	Smooth and pleasant	Smooth and pleasant
5	apeearance	glossy	glossy	glossy	glossy

2.pH-

Formulation code	F1	F2	F3	F4
PH	6.8	7.3	6.5	6.4

3.Phytochemical analysis.

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1. TEST FOR ALKALOIDS: A. Mayer's test: Add few drops of Mayers reagent (Potassium mercuric iodide solution) along the sides of the test tube. B. Wagner's test: add few drops of wagners reagent (iodine Potassium iodide solution) 2.TEST FOR CARBOHYDRATES: A. Molisch test: Add 2 drops of alcoholic solution of alpha-napthol and 1ml of conc. sulphuric acid slowly along the sides of test tube. B. Fehling's test: 1ml of sample was boiled on a water bath with 1ml each of feelings solutions A and B. 3.TEST FOR GLYCOSIDES: A. Bontrager's test:To 2ml of sample solution, 3ml of chloroform was added and shaken chloroform layer was separated and 10%ammonia hydroxide solution was added to it. 4.TEST FOR PHYTOSTEROLS AND TRITERPENOIDS: A. Libermann Burchard test : The extract was dissolved in acetic anhydrous, boiled, cooled and 1ml of conc. sulphuric acid is added along the side of the test tube. 5.TEST FOR PHENOLS AND TANNINS: A. Ferric chloride test: Add few drops of 5%ferric chloride solution.	White or creamy precipitate is formed Reddish brown precipitate is formed Purple to violet colour ring is formed Brick red precipitate Pink colour is formed indicating the presence of anthroquinone glycosides Red, pink or violet colour at the junction of liquid indicates glycosides presence Formation of blue, green and violet colour Yellow fluorescence indicates flavonoids presence	+ +++ +++ +++ + +++ +++ +

4. Hardness Test:

Sr No.	Sample	Results
1	**F1**	0.7 kg/cm2
2	**F2**	0.6 kg/cm2
3	**F3**	0.6 kg/cm2
4	**F4**	0.6 kg/cm2

5. Blooming test Fat Bloom

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Result	Result
Fat bloom	No
Sugar bloom	No

6. Physical Stability :Test group selected for stability study

parameters	Storage condition	At the time of preparation	After the one month
Colour, odour, taste,mouth feel, appearance	2-8^{o} C	Brown,choclaty,slightly bitter, smooth,glossy	No change

7. Moisture Content (%) = $W2- W3 /W\times 100$
= 44 – 43.5 / 42 × 100 = 15%

III. CONCLUSION:

In the present study, development of Pediatric Herbal Chocolate having antioxidant activity was carried out. Aqueous extract of beetroot leaves was prepared and phytochemical analysis was carried out to check the presence of desired compounds that shows the acceptable results. By using prepared extract medicated chocolate prepared and evaluated for general appearance, dimension, hardness, blooming test, drug content determination and physical stability. From above study, we concluded that the chocolate provides smooth and creamy texture to the formulation and are good for masking the unpleasant taste associated with some drugs. Also, good oral drug delivery system to gives therapeutic effect. The evaluation studies were satisfactory, out of four formulations; F4 formulation has shown better results when compared with other 3 formulations.

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