

Formulation evaluation and development of brain boosting herbal chocolate

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Abstract

The chocolate is most favorite food among the individuals i.e., children's, teenagers, and old age person. The aim of the today's study was to formulate chocolate contains medicated herbal ingredients to prevent brain memory as well as mental health. The target of this formulation to design herbal chocolate containing medicinal effect and to formulate developed and evaluates brain boosting natural chocolate that will work on the memory enhancing. Chocolate is range of product derived from cocoa powder mixed with fat and finally sugar powder to produce a solid semifluid. The chocolate is product which love every age people i.e., children, teenagers as well as old age persons to eat but due to health issues like obesity, hypertension, coronary artery diseases, diabetes etc. doctor refuses patient to intake of chocolate. Chocolate formulation contains ashwagandha, shatavari, brahmi, almond and tulsi. The target of present study was to developed the chocolate contain drug i.e., medicated chocolate to cured the mental and physical health. Memory is the functional unit of the human brain. The human mind can store the all types of information in the form of memory. The herbal boosting chocolate can help to recalling the all types of information. Chocolate is synthetic food that can create completely different taste and texture sensations. Poor memory, lower maintenance and moderate review are normal issues in today's distressing and focused world. Now a days the low remembered power is the main issue of all individual like teenagers and old age peoples. Chocolate is an anhydrous medium that resist microbial growth and to hydrolysis of water-sensitive active agents. Nowadays, studies show that eating high flavonol cocoa can increases flow of blood to the brain in young and adults. Dark chocolate contains a decent amount of soluble fiber and is loaded with minerals. The main active pharmaceutical ingredients of herbal boosting chocolate are the herbs.

Keywords: Explaining The Significance of Herbal Chocolate; Utilizing the Chocolate for Mental Health; A Compressive Review for Scientific Literature on Herbal Chocolate on Their Nutritional Properties; Assessing the Pharmacological Potential of Various Component of Herbal Chocolate Through *In-Vivo* and *In-Vitro* Studies; Utilizing the Herbal Chocolate in Daily Use

1. Introduction

Herbal formulations can be defined as dossage form containing one or more than one herbal drug or processed herbal drug in particular amount to provide particular nutritional, cosmetic benefits as well as health benefit planned for use to check, treat, mitigate or alter the bodily functions. [1] Herb is any plant or part of plant which having the various medicinal uses and a lot of advantages. Recollections are vital to our uniqueness. What each of us recalls is not quite the same as what others recollect, even of circumstances we have been in together. So far, in our non-mistakable courses, everyone can recollect occasions, truths, happy emotion and inclination - some for a brief timeframe, others for a lifetime. [2] The recollection and utilization of herb is a necessary for the physical and mental health. Chocolate is

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adaptable food that can be combined to create completely different taste and texture sensations. Dark chocolate is powerful source of antioxidants which contain 70% or high coca, helps balance blood glucose, improve blood flow and blood pressure, reduce heart disease, improve brain function.[3] Herbal chocolate having a lot of medicinal properties like improve physical health, improve mental health, provide nutrition as well as energy. Memory is the capacity of individual to record tangible jolts, occasions; data, and so forth hold them over short or drawn out stretches of time and review the same at later date when required.[4] Memory is a functional unit of the brain which stores all types of information. Chocolate is adaptable food that can be combined to create completely different taste and texture sensations.

[5] Chocolate is the synthetic food which is made using the chemicals but, the herbal chocolate is completely free from the chemical. Poor memory, lower maintenance and moderate review are normal issues in today's distressing and focused world. [2] Now a days the low remembered power is the main issue of all individual like teenagers and old age peoples. Chocolate is an anhydrous medium that resist microbial growth and to hydrolysis of water-sensitive active agents. [3]

Chocolate is one of the antimicrobials as well as antioxidant compound. We all gripe about our recollections, they are in the most part really great, just beginning to come up short in seniority or certain neurological sicknesses.[4] The neurons in the human body can be easily functioned by the brain boosting herbal chocolate. Chocolate significantly contains material such as saturated fat, sterols, diterpines and triterpenes, alcohols, and methyl xanthine. Phenyl ethylamine that naturally occurs in the brain and it is termed as 'the love drug' which produces the feeling of well-being and contentment. [6] The phenyl ethylamine is the happy feeling drug. Age, stress, feelings are conditions that might prompt memory misfortune, amnesia, uneasiness, hypertension, dementia, or to more dismal dangers such as schizophrenia and Alzheimer's ailment (AD). [2] These types of conditions can be cured, treat and prevent by herbal drugs. Phenyl ethylamine also present in chocolate that raises blood pressure, also blood sugar level that gives the feeling of wellness. [7] Phenyl ethylamine is most important compound in the brain. Albeit different manufactured medications for memory improvement are accessible, reactions connected with them make their utilization restricted. In the late years, there has been an ascent in light of a legitimate concern for academic group and pharmaceutical research facilities to investigate the restorative advantages of herbs to enhance memory.[4] There are five basic human taste qualities i.e., sweet, sour, bitter, salty, savory. Sweet taste is one of the most pleasurable senses. Considering generally acknowledgment of chocolate from pediatric to geriatric group the essential target of this study was chosen. The goal of the sweet taste is to detect the highly calorific saccharides for ingestion. [8] Chocolates additionally indicates medical advantages including, lessening in hypertension, change in blood stream to cerebrum, counteract cell harm and enhances glucose levels, it likewise diminishes danger of heart assault, raises HDL cholesterol and brings down LDL cholesterol. Medicinal chocolate is developed by using chocolate base and the drug is filling into prepared chocolate base. [9] The latest exploration view concentrates on planning and prediction of the healthy chocolate containing bramhi and shatavari as nervine tonics that will have additional recipient learning and memory improving impact with zero reactions. Medicated chocolate is prepared by using chocolate base and the drug is incorporated into prepared chocolate base. The drug is incorporated within the chocolate and the drug is released from the chocolate; it is called as Chocolate drug delivery system.

1.1. Ideal Characteristics

- It should have good taste.
- It should have high quality.
- It should have silky smooth texture.
- It should have distinct flavor.
- It should melt in mouth or in hand.
- It should have good color.
- It should be attractive.
- It should be cheap.
- It should be easily available.
- It should be economical.

2. Material and methods

2.1. Ashwagandha

- **Biological Source** Ashwagandha is obtained from the dried roots and stem bases of *Withania somnifera* Dunal.
- **Family** - Solanaceae.

- **Medicinal Uses And Significance** Ashwagandha is useful for different types of diseases like memory loss, stress induced diseases, malignoma and others. Ashwagandha is used as a household remedy by Indians, who consider it as the best tonic for old people and children, and as aphrodisiac by young people.



Figure 1 Ashwagandha

2.2. Shatavari



Figure 2 Shatavari

- **Biological Source** – Shatavari is derived from dried tuberous roots of *Asparagus racemosus* Wild.
- **Family** – Liliaceae.
- **Medicinal Uses And Significance** – Shatavari increases the production of prolactin, a hormone that is important for breast feeding. Shatavari has been used to attempt to treat conditions related to hormone imbalance such as polycystic ovarian syndrome and infertility. Reduce symptom of menopause.

2.3. Brahmi



Figure 3 Brahmi

- **Biological Source** – Brahmi is obtained from the fresh or dried herb of *Centella asiatica* (L.) (syn. *Hydrocotyl asiatica* Linn.)
- **Family** – Umbelliferae.
- **Medicinal Uses And Significance** – Brahmi is used for Alzheimer's disease, improving memory, anxiety, attention deficit- hyperactivity disorder, allergic conditions, irritable bowel syndrome, and as a general tonic to fight stress.

2.4. Almond



Figure 4 Almonds

- **Biological Source** – Almond is fixed oil obtained by expression from the seeds of *Prunus amygdalus*.
- **Family** – Rosaceae.
- **Medicinal Uses and Significance** – Almond used as anti-inflammatory, anti-parasitic, anti-bacterial, anti-fungal. Almond is also used to reduce cholesterol and the risk of heart diseases.

2.5. Tulsi



Figure 5 Tulsi

- **Biological Source** – Tulsi consists of fresh and dried leaves of *Ocimum* species like *Ocimum sanctum* L. and *Ocimum basilicum* L.
- **Family** – Labiatae.
- **Medicinal Uses and Significance** – Tulsi is used to treat insect bites. Tulsi is also used to treat heart disease and fever. Tulsi is also used to treat respiratory problems. Tulsi is used to cure fever, common cold and sore throat, headaches and kidney stones.

2.6. Shankhapushpi

- **Biological Source** - Shankhapushpi of ayurvedic pharmacopoeia of Indian consists of the whole plant of *Convolvulus pluricaulis* (CP) Choisy.
- **Family** – Convolvulaceae.
- **Significance And Medicinal Uses** – According to the ancient literature, this herb has been attributed with several therapeutic properties, such as anxiolytic, neuroprotective, antioxidant, analgesic, immunomodulatory, antimicrobial, antidiabetic and cardio protective activities.



Figure 6 Shankhapushpi

2.7. Other material

- Pumpkin Seeds - A pumpkin seed, also known in North America as a pepita, is the edible seed of pumpkin or certain other cultivars of squash. The seed are nutrient and calorie rich with an especially high content of fat, protein, dietary fiber, and numerous micronutrients.
- Cocoa Powder - Cocoa powder is rich in theobromine, which helps to reduce inflammation and can protect you from diseases such as heart diseases, cancer, and diabetes. Cocoa powder act as antioxidant, lower the BP, improve heart health, reduce the risk of diabetes, boost immunity, protect against cancer, protect against neurodegeneration, enhance mood.
- Aspartame Sugar – Aspartame is an artificial sweetener widely used in various food and beverage products since the 1980s, include diet drinks, chewing gum, gelatin, ice cream, dairy product such as yogurt, breakfast cereal, toothpaste and medications such as cough drops and chewable vitamins.
- Cocoa Butter - Cocoa butter, also called theobroma oil, is a pale-yellow, edible fat extracted from the cocoa bean. Cocoa butter has a cocoa flavor and aroma. It is an essential major ingredient of chocolate and related confectionary products.
- Strawberry - The garden strawberry is a widely grown hybrid species of the genus fragaria, collectively known as strawberries, which are cultivated worldwide for their fruit. The health benefit include reduce cholesterol, blood pressure, inflammation, and oxidative stress.
- Soya Lecithin - It is generally used as an emulsifier, or lubricant, when added to food, but also has uses as an antioxidant and flavor protector. Lecithin is a naturally occurring substance derived from several sources, including egg yolks, soybeans, sunflower, canola, corn and others.
- Ethanol – Ethanol is an organic compound with the chemical formula $\text{CH}_3\text{CH}_2\text{OH}$. Ethanol is volatile, flammable, colorless liquid with a characteristic wine like odor and pungent taste.

3. Method

Extraction Of Herbal Drugs - The extraction was done by cold maceration process. First, the powdered plant material of pumpkin seed sand bramhi was macerated with mixture of Alcohol and Water (70: 30) in RBF (round bottom flask) for 24 hours with occasional shaking. After 24 hours, the solvents were subjected filtration and then extracts of pumpkin seeds and bramhi were collected. After, this the almond, tulsi, shatavari, ashwagandha, also macerated with alcohol (70: 30).

3.1. Preparation of Chocolate formulation

- All the ingredients were weight accurately.
- In one beaker, cocoa powder and sugar was taken and mixed properly.
- In another beaker, cocoa butter has melted and this melted butter was added in a powder mixture and mixed properly to get fine consistency.
- After that soya lecithin as an emulsifier was added and mixed.
- Finally, the herbal drug (pumpkin seeds, Brahmi, Almond, shatavari, Ashwagandha and Tulsi) extract was measured accurately and added in above prepared chocolate.
- Then strawberry as a flavoring agent was added before going to set in moulds.
- Then the prepared chocolate containing herbal drug extract was poured in moulds and kept in freeze to set overnight.

**Figure 6** Herbal Dark Chocolate**Table 1** Ingredient table

Sr.no	Ingredients	Quantity
1	Ashwagandha	70 mg
2	Shatavari	70 mg
3	Tulsi	70 mg
4	Almonds	70 mg
5	Brahmi	70 mg
6	Shankhapushpi	70 mg
7	Pumpkin Seeds	500 mg
8	Cocoa Butter	2.8 mg
9	Soya Lecithin	0.05 gm
10	Sugar	3.6 gm
11	Strawberry Flavor	0.05 gm
12	Dark Chocolate	10 gm
	Total	21.2 gm

Table 2 Marketed Formulation

Sr. No.	Brand Name	Use
1	Active Mix Powder	Boost muscles growth and memory
2	Multivitamin Bites Chocolate	Build immunity
3	Neurozan Tablets	Improve cognitive functions and mental health
4	Iyurved kids and teens brain chocolate spread	For memory and focus
5	Sfido brain booster advance	For brain support, bones and joints
6	Rooted brain boost	Memory, Focus and blood enhancer
7	Dr. morepen memory booster	For focus, memory and mood
8	Giver ultra-brain	For focus, energy and memory
9	Healthy hey brain focus	Brain health powder
10	Anti-neoplastic chocolate	For treatment of cancer

3.2. Evaluation parameter

- Organoleptic Properties - Organoleptic properties are the properties of food product that stimulate human sensory organs.
 - Color - Color is a very important organoleptic property. Color can increase the patient acceptance. Color also made the product attractive.
 - Odor – Odor is also a very important organoleptic property. Odor means a smell can increases patient acceptance towards the product.
 - Taste – Taste is also one of the important organoleptic properties. A good taste can increase the patient acceptance and also make the mood happy
 - Appearance – Appearance is also one of the most important organoleptic properties. A good appearance can increase the patient acceptance.
- pH – pH means a power of hydrogen. pH can state the nature of substances i.e., the substance is acidic, basic or neutral.
- Blooming Strength – The test determines the weight in grams needed by a specified plunger to depress the surface of chocolate without breaking it at a specified temperature.
- Stability Studies - A general method for predicting the stability of any product is accelerated stability studies, where the product is subjected to elevated temperatures as per the ICH guidelines. A short term accelerated stability study was carried out for the period of 3 months for the prepared formulation.
- Hardness – The hardness of chocolate can be determined by the Pfizer and Monsanto apparatus. The hardness of chocolate can be determined for the transportation and stability.
- Melting Point – The residual heat of the chocolate will melt it. Do not rely on appearance alone when microwaving chocolate.
- Physical Stability – To check the physical stability, sample of chocolate was kept in closed container for 1 month at 28°C after one month interval, Test sample of chocolate was observed for physical appearance and drug degradation.
- Drug content determination - Drug content of medicated chocolate was determined by Thin Layer Chromatography. Here, control was taken as aqueous TLC plates were prepared by using silica gel G and plates were activated for half an hour. Spotting was carried out on both plates i.e., control and test plate by using capillary. Run both the plates in mobile phase i.e., Toluene: Ethyl acetate: Water having ratio 7:3:2. After running of both plates air drying of plates was carried out. Further, visualization of both plates was carried out by using iodine chamber. By comparing the RF value of both the plates i.e., control and test, Drug content in Medicated chocolate was determined.
- Estimation of herbal drug – Estimation of herbal drug carried out by TLC and HPTLC.
- Protein content – The protein content was determined by following formula, Calculation of protein content:
 - Total nitrogen (% w/w) = $V / W \times 0.14$ 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
- Moisture content – The moisture content can be carried out by the following formula, Formula: Moisture Content (%) = $\frac{W2 - W3}{W} \times 100$
 - Where,
 - W = weight of sample (g)
 - W2 = weight of empty petri dish (g) + sample (g)
 - W3 = weight of the petri dish after drying (g)
- Viscosity – The viscosity is an important evaluation parameter. The chocolate with a viscosity of 50 or less is considered to be low viscosity chocolate.

4. Conclusion

It can be concluded that the batch as an optimized batch, provides sweetening property as compared to others, pH and stability profile to be satisfactorily. The flavonoids in chocolate may help protect the brain. The organoleptic properties of chocolate are excellent for masking unpleasant flavours associated with some active agents and imparting a smooth and creamy texture to composition of active agents. The drugs extract which are used in the dose range are safe consumption and can be swallowed without any risk of side effects.

Compliance with ethical standards

Disclosure of conflict of interest

No conflict of interest to be disclosed.

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