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Research Article

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Terminalia arjuna and Ocimum sanctum Fortified Neutraceutical Chocolate

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ABSTRACT

Nutraceutical foods have received specific interest because of their presumed safety and potential nutritional and medicinal effect. Hypertension is associated with heart problems, however, supplementation of Terminalia arjuna and Ocimum sanctum (Tulsi) as a neutraceutical plays a significant role in preventing the formation of free radical due to their antioxidant activity. In the present research, we have proposed the use of unique combination of Terminalia arjuna and Ocimum sanctum can significantly induced antioxidant activity. We developed first time novel neutraceutical chocolate that was tested through sensory analysis such as subjective and objective (Moisture, ash, reducing sugar, fat, and protein % analysis according to AOAC method). It has been also proved in vivo 15 days experiment that neutraceutical chocolate was non toxic and significantly purified blood.

Key words: *Tulsi, Sugar, Fat, Protein, Antioxidant*

INTRODUCTION

Food composition has been scientifically proven to cause lifestyle-related disorders, and has become a social issue. Lifestyle-related disorders such as alzheimer's disease (AD), cardiovascular diseases, obesity, are due to oxidative stress. However, food can be significantly used as medicine to cure and prevent disease this fact was supported by ayurveda. Nutraceutical is any healthy biotransformable food extract supplement that has scientifically proven health benefits for both nutritional and therapeutic effects[1].

Plants have been known as an backbone of traditional medicine because of their nutraceuticals properties[2]. Terminalia Arjuna bark powder contains flavonoids, arjunolic acid hence it had cardiotonic activity potential and reduced lipid oxidation stress[3]. Ocimum sanctum (Tulsi) leaves extract has lipid-lowering and antioxidative effects that protect the cardiac against atherosclerosis[4].

Tulsi phytochemicals eugenol, rosmarinic acid, apigenin, myretenal, luteolin, β-sitosterol, and carnosic acid increasing the antioxidant activity[5].

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In order to the potential efects of adding sugar to cocoa and transform to solid chocolate. There is an emerging interest over the potential role of cocoa in enhancing human health due to content of polyphenol. Cocoa flavanols may reduce blood pressure and reduce risk of cardiac disease, is via its eff ect on nitric oxide (NO) and also sugar content of chocolate could potentially negate any impact of the cocoa flavanols. In chocolate and cocoa, the flavanols content has been reported as being highly stable. Sugar foods appear to increase absorption and Possibly through conjugation of aglycone forms of flavanols[6].

Chocolate development needs the appropriate mouth feel and/or aroma/flavor. In the United States, chocolate is subject to a standard of identity established by the U.S. Food and Drug Administration (FDA) under the Federal Food, Drug and Cosmetic Act.

Sensory such as subjective and objective analysis is powerful and sensitive techniques to measure human responses to food products[7].

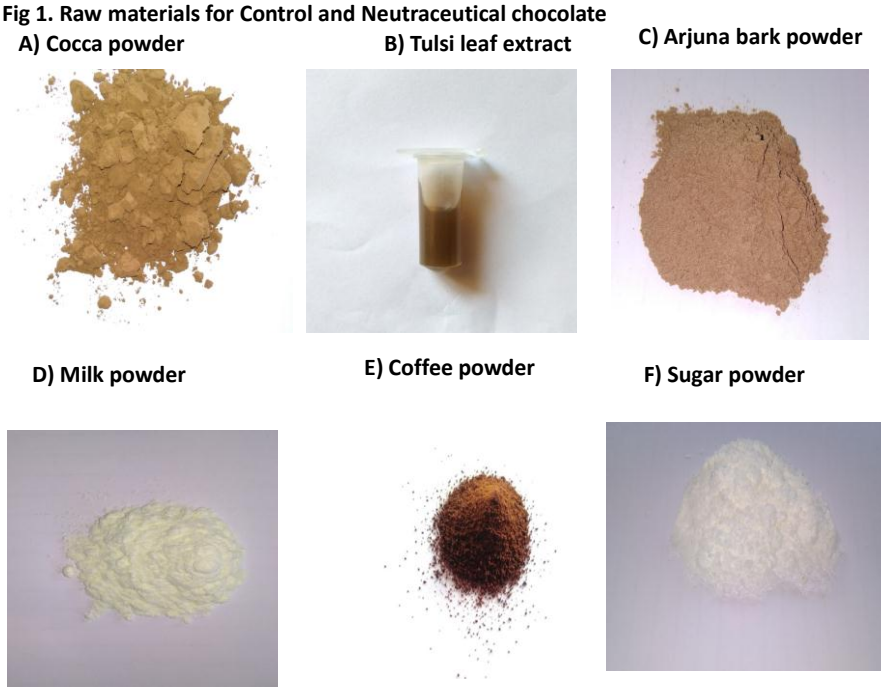
Sensory evaluation of the chocolate samples were carried out by 20 panelists of judges, on a 9 point hedonic scale for different parameters such as taste, texture, aroma and overall acceptability .Proximate analysis of chocolate samples determined were: moisture, ash , carbohydrate, fat , protein respectively[8].

In the present research proposes that our novel and innovative dual anti-oxidative properties enrich *Terminalia arjuna* and *Ocimum sanctum* fortified neutraceutical chocolate can significantly overcome problems of oxidative stress life style disorder problems.

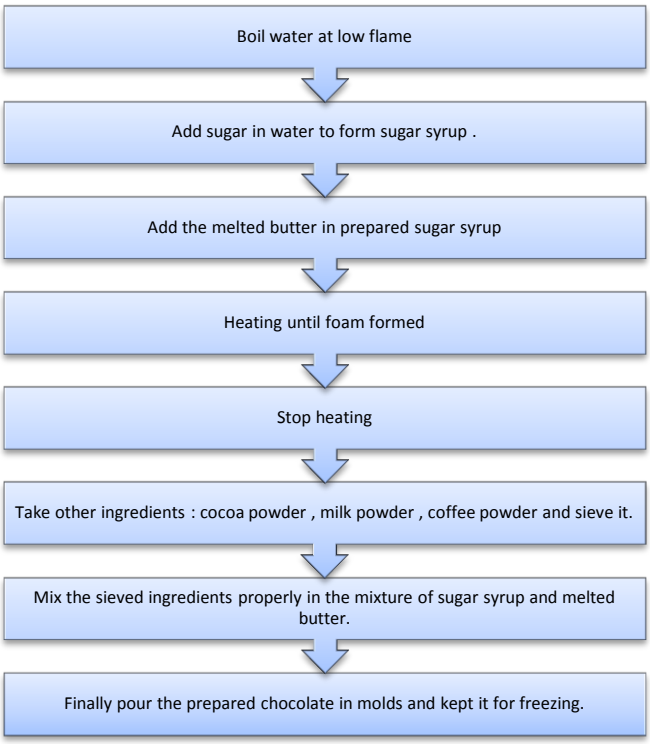
- **Methodology of Chocolate :**
  - Collection of raw materials for neutraceutical chococlate preparation:

    Sugar, butter (warana pasteurized table butter), warna skimmed milk powder (warana), rich dark cocoa powder (Quality bakery), coffee powder (Nescafe classic) and vanilla essence (artificial food essence from FLAVOURS CO. PVT.LTD.) collected from local chiplun market. Arjuna bark (parches from ayurvedic store) and tulsi leaves collected from s. p .college of food technology garden. Arjuna barks powder and Tulsi leaves extraction was collected by mechanical processing as shown in Fig.1.

Fig 1. Raw materials for Control and Neutraceutical chocolate



- Processing of Control Chocolate (T0) :



- Processing of *Terminalia Arjuna and Ocimum sanctum* fortified Neutraceutical Chocolate T1/T2 was same processing except its ratio of ***Terminalia arjuna powder* and *Ocimum sanctum***.

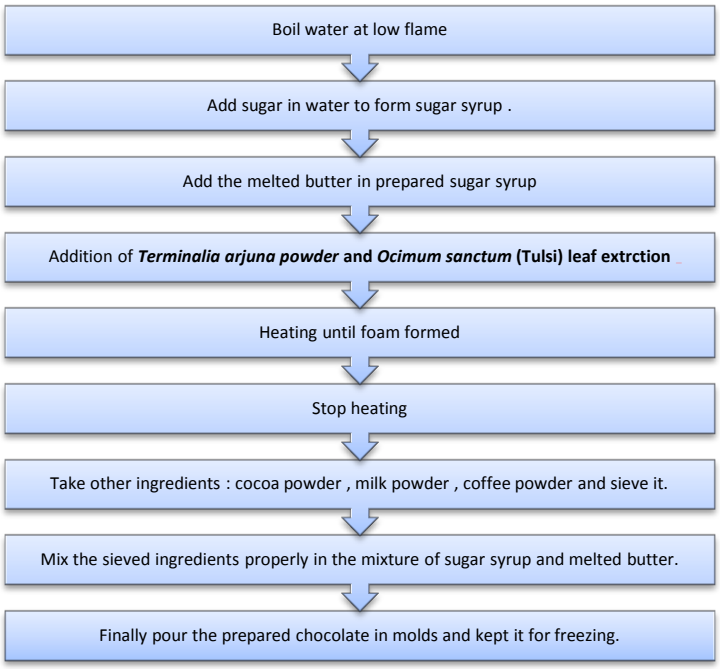


Fig.No2 . Control chocolate (T0) And *Terminalia Arjuna* And *Ocimum sanctum* fortified Neutraceutical Chocolate (T2).

- Characterization of Control and (Treatment) neutraceutical chocolate through sensory analysis such as subjective and objective analysis:

➢ Characterization of Control and (Treatment) neutraceutical chocolate through sensory subjective analysis:

Table 1: Sensory evaluation (Subjective)

Sensory evaluation Parameters	(To) Control chocolate	(T1) Arjuna powder (1000mg) and Tulsi (10ml) fortified neutraceutical chocolate	(T2) Arjuna powder(2000mg) and Tulsi (20ml) fortified neutraceutical chocolate
1.Texture 2.Taste 3.Flavor			

	Control chocolate	Neutraceutical chocolate (1)	Neutraceutical chocolate (2)
Texture	6	7	8
Taste	6	7	9
Flavour	5	6	8

As a proof of this research sensory study of control and treatment chocolate was done by Special panel of food technologist at Department of food technology, S.P. College of food technology, Tal: Chiplun, Dist: Ratnagiri, MS, India.

Note: On the basis of sensory analysis we had chosen the T2 neutraceutical chocolate for proximate analysis.

➢ Objective analysis: Proximate analysis done according to ASSOCIATION of OFFICIAL ANALYTICAL CHEMISTS (AOAC) method.

- Moisture percent: control chocolate and treatment chocolate moisture determined by transfer 5 g of the prepared sample in a previously dried, tared aluminum dish. Moisture determination of Chocolate control and treatment chocolate carried out at 105 0 ± 1 0C for 3 hours. Cool in desiccators and weigh.

- Ash percent: Each 5 grams of control chocolate and treatment chocolate ash determined through muffle furnace at a temperature of 550 ±100 C until the ash is free of Carbon. Cool in desiccators and weigh.
- Reducing sugar: Performed the titration on Fehling's solution similar to determined of control chocolate and treatment chocolate total carbohydrate percent.
- Protein determination: Kjeldahl apparatus used for determined of control chocolate and treatment chocolate protein percents. Process was carried out by digestion in sulfuric acid with catalyst at 250 degree Celsius, distillation with alkali treatment and finally nitrogen collected in boric acid titrated with 0.02 N H2so4.Total protein was calculated with factor 6.25.
- Fat: Control chocolate and treatment chocolate fat was determined by soxhlet apparatus. Petroleum ether used for fat extraction and process carried out up to 6th cycles. Fat was dried by keeping the flasks for 30 minutes and weighed, till constant mass is achieved.

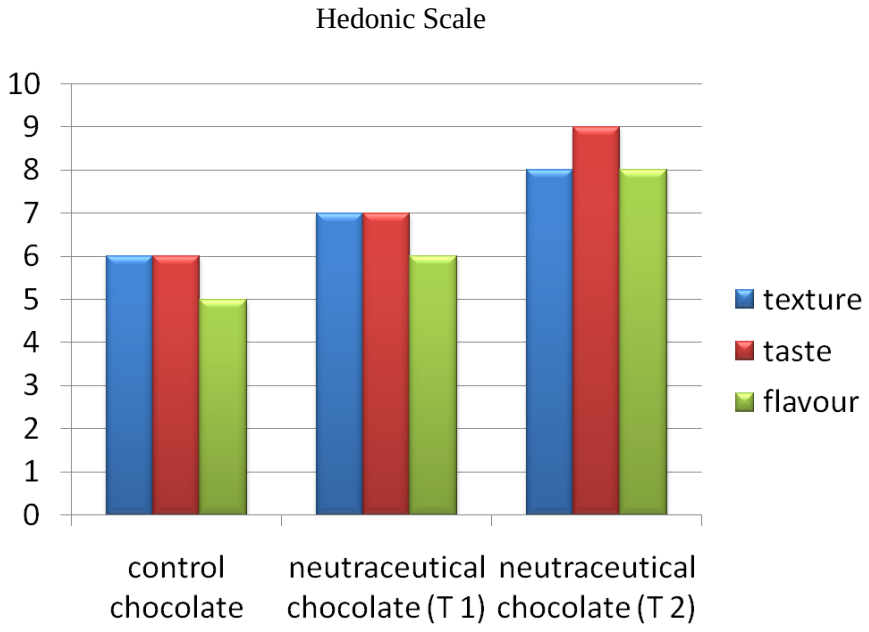
➢ In vivo testing of control chocolate and treatment chocolate:

Control chocolate and treatment chocolate as solution introduced into drinking water of each 3 animal models (Chicken). All animal models kept inside cage at control room temperature condition and humidity (~52%). After 15 days each 3 animal models observed its characterization.

RESULT

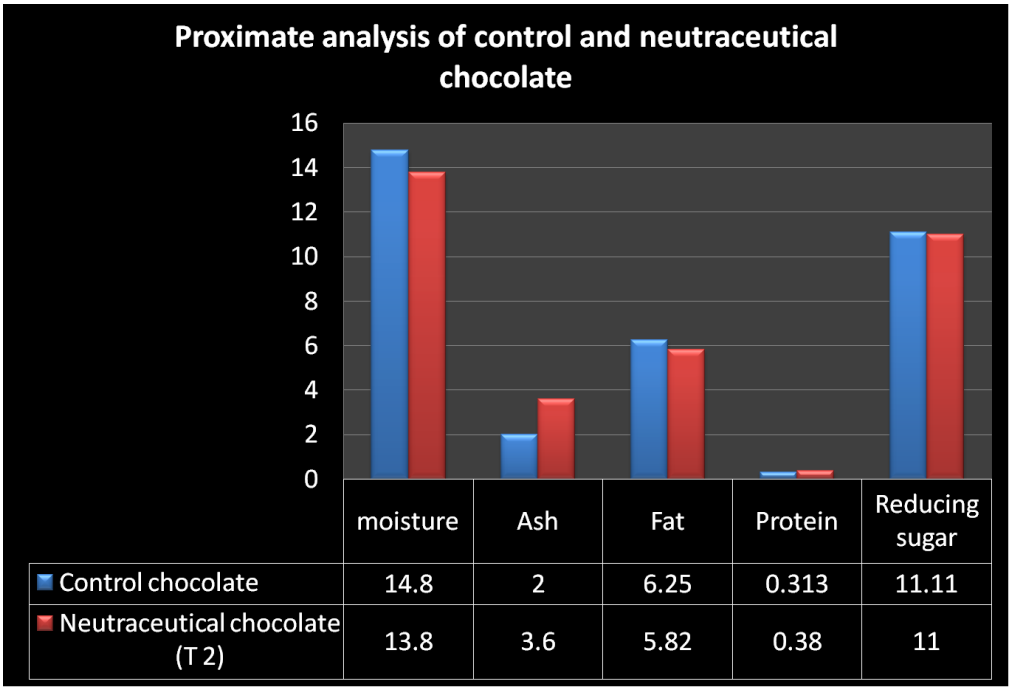
➢ Sensory evaluation (subjective):

Graph.1. Sensory Analysis of Control (To) And Treatment (T1/T2) Neutraceutical chocolates:



➢ Sensory Analysis (Objective):

Graph.2. Control (To) And Neutraceutical chocolate (T2) Sensory Analysis (Objective):



- Phytosterol detection of neutraceutical chocolate

Chloroform, H2SO4, neutraceutical chocolate enhanced reddish brown colour in chloroform layer its signal to presence of phytosterols in the neutraceutical chocolate.

- Thin layer chromatography testing for neutraceutical chocolate flavoniods.

The present flavonoid compound of this neutraceutical chocolate was detected as blue spot on developed TLC plate with the help of anisaldehyde sulfuric acid was sprayed on the surface of the TLC plate .

- In vivo Testing of Control Chocolate And Treatment (T2) Neutraceutical Chocolate:

After 15 days each 3 animal models observed its characterization such as:

The following study was undertaken to determine the following:

- Blood glucose level test:

Control chicken (T0) blood glucose level: 45 mg/5 ml

Treatment (T2) Neutraceutical Chocolate: 40 mg/5 ml

CONCLUSION

Present investigation is to developed *Terminalia Arjuna* And *Ocimum sanctum* fortified Neutraceutical Chocolate was characterized by sensory analysis and *in vivo* experiment studied. Thus this study first time highlights a novel approach to neutraceutical chocolate as a functional food and can be significantly regulate blood mechanism by inducing as an antioxidant activity.

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