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Process optimization and standardization of oat milk based herbal beverage incorporating Ashwagandha, Sarpagandha and garlic

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Abstract

The exploration of herbal beverages extends beyond mere chemical analysis; it encompasses a comprehensive understanding of their nutritional profile and the implications for human health. This research paper provides a comprehensive overview of herbal beverages, shedding light on their nutritional and sensory dimensions. By consolidating existing knowledge and emphasizing their potential health benefits, this study aims to promote further research and innovation in the field of herbal beverage development and utilization, ultimately contributing to the well-being of individuals and communities worldwide. The present paper focuses on the herbal beverage as it is prepared by mixing ashwagandha and sarpagandha with oatmilk with the objective of assessing the sensory acceptability of the product with physicochemical and microbiological properties. Each treatment was replicated five times. Four drink formulations were prepared by mixing oatmilk with other three ingredients in the ratio (100:00, 95:05, 90:10, 85:15) and they were marked as T0, T1, T2, and T3 respectively.

Keywords: Oatmilk, ashwagandha, sarpagandha, nutritional, beverages, herbal

Introduction

Drinks created from various plants, herbs, flowers, and spices are known as herbal beverages. They are frequently infused with water or other liquids. Due to their supposed health benefits and distinctive flavours, these drinks have been enjoyed for centuries in many different civilizations all over the world.

Herbal beverages have been consumed for centuries across cultures, primarily for their potential health benefits and unique flavors. This research paper aims to provide an in-depth analysis of the various herbal beverages, emphasizing their diverse phytochemical compositions and potential therapeutic properties. Through a comprehensive review of existing literature and experimental studies, this research delves into the nutritional, medicinal, and sensory aspects of herbal beverages.

Consequently, there has been a significant increase in the demand for novel beverages that add functionality to nutrition while improving consumer health. Certain beverages derived from cereals, such as barley, oat, buckwheat, wheat, and brown rice, and from legumes, such as black bean, are designated nutritional supplements as they have abundant highly bioavailable essential nutrients.

Withania somnifera Dunal (ashwagandha, WS) is widely used in Ayurvedic medicine, the traditional medical system of India. It is an ingredient in many formulations prescribed for a variety of musculoskeletal conditions (e.g., arthritis, rheumatism), and as a general tonic to increase energy, improve overall health and longevity, and prevent disease in athletes, the elderly, and during pregnancy.

In Ayurvedic medicine, its root is used as an anti-inflammatory drug for swellings, tumours, scrofula and rheumatism; and as a sedative and hypnotic in anxiety neurosis. Leaf possesses anti-inflammatory, hepatoprotective, antibacterial properties.

Rauvolfia Serpentina is a medicinal plant of exceptional medicinal properties. It is a major medicinal plant in Indian and Chinese traditional therapeutics. In India, the use of this herb is almost 3000 years old and was known as Sarpagandha. The medicinal properties are due to the various phytochemicals found in various parts of the plant. The chemistry and therapeutic use of various alkaloids found in *R. Serpentina* have been extensively investigated and authenticated. It has shown two main pharmacological actions i.e. lowering of Blood pressure and sedative actions.

Successful clinical trials have been undertaken to establish its use in neuropsychiatry, gynaecological and geriatric disorders also. The therapeutic use of *R Serpentina* has been studied in mental disorders like Anxiety, schizophrenia, bipolar disorder, epilepsy, seizures, insomnia and sleep disorders.

Garlic (*Allium sativum* L.) belongs to Alliaceae family. The origin of garlic is thought to be in Central Asia (India, Afghanistan, West China, Russia) and spread to other parts of the world through trade and colonization. Garlic has been used in China and India for more than 5000 years, and Egypt since 2000 B.C. Garlic is the most important Allium crop and ranks second next to onion in the world (Voigt, 2004) [16].

Materials and Methods

The present experiment entitled “Sensory and Nutritional Analysis of Oat Milk based Herbal Beverage incorporating Ashwagandha, Sarpagandha and Garlic” was conducted in the Laboratory of Food Engineering, Warner College of Dairy Technology, Sam Higginbottom University of Agriculture, Technology and Sciences (SHUATS), Prayagraj (U.P) during the year 2021-23.

Materials used: Oats were procured from local market of Prayagraj to make oatmilk. Ashwagandha and Sarpagandha roots were procured from the market to extract root powder. Garlic, Ginger and Turmeric and Jaggery powder were procured from the local market.

Procedure

Preparation of Oatmilk

Preparation of oat milk is based on an enzymatic process which involves simultaneous gelatinization and liquefaction of rolled oats at 70–75 °C, through an enzymatic reaction. The protocol followed for the preparation of oat milk (Deswal *et al.* 2013) [8]. Firstly rolled oats were soaked in water for 2-3 hrs, then were washed out and put in mixer grinder with addition of water with ratio of 1:3. The liquefied oat solid was filtered with the help of muslin cloth. Obtained oat milk can be used be stored for further use.

Extraction of powder from roots

Ashwagandha and Sarpagandha roots were cleaned and left under the sunlight for 2-3 days. Roots were then grinded in a high rpm grinder, and sieved the fine powder with the help of fine cloth.

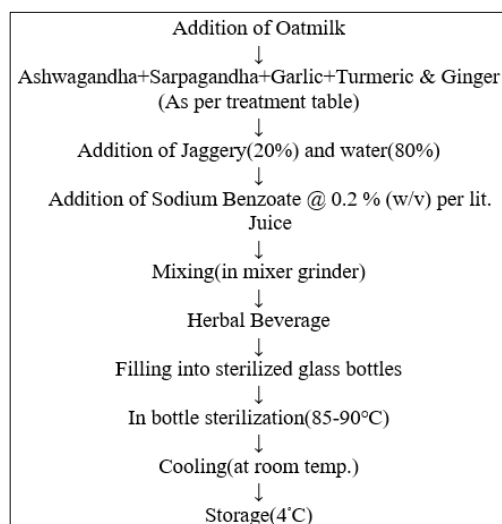


Fig 1: Flowchart for preparation of Herbal Beverage

Table 1: Formulations of Different treatments:

Treatments	Ingredients			
	Oatmilk	Ashwagandha powder	Sarpagandha powder	Garlic powder
T0	100	0	0	0
T1	95	2.5	2	0.5
T2	90	5	4	01
T3	85	7.5	6	1.5

Results and Discussion

The results were obtained on the basis of Sensory, Physicochemical and Microbiological attributes. Sensory was performed by the judges panel along with the other members of the Department. Physico-chemical analysis was performed by the various methods of AOAC and FSSAI. Microbiological analysis was performed by APHA Compendium of methods, 2016.

Table 2: Average Table

Treatments Parameters	T0	T1	T2	T3
Physico-chemical Analysis				
TSS (°brix)	7.3	10.86	10.62	10.44
Moisture	92.82	85.3	83.22	80.78
Fat	0.82	0.80	0.78	0.76
Protein (%)	0.75	0.90	0.92	0.95
Ash (%)	0.64	0.55	0.56	0.58
Carbohydrate (%)	4.97	12.45	14.52	16.93
Titration Acidity (%)	0.45	0.43	0.41	0.39
Antioxidant (%)	54.48	68.10	71.61	74.02
Microbiological Analysis				
TPC(10 ^{*3} cfu/ml)	1.3	2.2	2.08	1.86
Yeast and Mould(10 ^{*3} cfu/ml)	Nil	Nil	Nil	Nil

Table 3: Sensory Evaluation

Colour and Appearance	7.6	7.2	7	6.4
Flavour and Taste	7.4	7.6	7.2	7.0
Consistency	7.6	7.4	7.2	6.8
Overall Acceptability	7.4	7.6	7.0	6.8

Sensory evaluation

Colour and appearance

The highest mean colour and appearance was recorded in sample T0 (7.6) followed by T1 (7.2), T2 (7.0) and T3 (6.4).

Flavour and taste

The highest mean flavour and taste was recorded in sample T1 (7.6) followed by T0 (7.4), T2 (7.2) and T3 (7.0).

Consistency

The highest mean consistency was recorded in sample T0 (7.6) followed by T1 (7.4), T2 (7.2) and T3 (6.8).

Overall acceptability

The highest mean overall acceptability was recorded in sample T1 (7.6) followed by T0 (7.4), T2 (7.0) and T3 (6.8).

Physico-chemical analysis

TSS: TSS was determined by the Refractometer method and the highest mean TSS was recorded in sample T1 (10.86) followed by T2 (10.62), T3 (10.44) and T0 (7.3).

Moisture

It was determined by Hot air oven method given in AOAC,2016, the highest mean moisture was recorded in

sample T0 (92.82) followed by T1 (85.30), T2 (83.22) and T0 (80.80).

Fat

It was determined by Soxhlet method and the highest mean fat was recorded in sample T0 (0.81) followed by T1 (0.76), T2 (0.73) and T3 (0.71).

Protein

It was determined by using method and the highest mean protein was recorded in sample T3 (0.95) followed by T2 (0.92), T1 (0.90) and T0 (0.75).

Ash

It was determined by Muffle furnace and the highest mean ash was recorded in sample T0 (0.64) T3 (0.58) followed by T2 (0.56) and T1 (0.55).

Carbohydrate

It was determined by subtraction method given by Ranganna,2005 and the highest mean carbohydrate was recorded in sample T3 (16.93) followed by T2 (14.52), T1 (12.45) and T0 (4.97).

Titration Acidity

It was determined by Titration method, the highest mean Titration acidity was recorded in samples T0 (0.45) followed by T1 (0.43), T2 (0.41) and T3 (0.39).

Antioxidants

It was determined using DPPH method, the highest mean antioxidant was recorded in sample T3 (74.02), followed by T2 (71.61), T2(68.10) and T0 (54.48).

Microbiological Analysis

TPC

The highest mean total plate count was recorded in sample T1 (2.2) followed by T2(2.08), T3 (1.86) and T0 (1.3).

Yeast and Mould

The Value obtained in the performed test was found to be negative indicating that the product was prepared in hygienic conditions.

Conclusion

The herbal beverage prepared has the potential to offer a combination of health benefits, including stress management, potential blood pressure regulation, immune system support, and cardiovascular health. However, it's crucial to consider the individual context and health conditions of the consumers. Consultation with a healthcare professional or registered dietitian is recommended before regularly consuming this beverage.

The purpose of this research work is to show that herbs can be successfully incorporated into a plant based milk at different incorporated levels to increase the nutrition level and enhance the sensory attributes of the prepared beverage.

From this research, we can conclude that the treatment T2 {Oatmilk, Ashwagandha powder, Sarpagandha powder and Garlic powder (90:5:4:1)} was found to be most acceptable in Sensory, Nutritional and Microbiological attributes.

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