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Standardization and Physico-Chemical Analysis of Herbal Drink Inclusion with the Herbal Components

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Abstract: ***A herbal beverage that was optimised and blended using sweet basil, ginger, mint, lemon juice, and sugar syrup was kept at room temperature for 60 days. It underwent physical - chemical, sensory, and microbiological investigation. For two months at room temperature, significant changes in pH, total soluble solids, and acidity were seen. The Total soluble solids increased during the storage period and were reported to be increased by (13.0 ± 0.14 to 14.4 ± 0.4) °Brix at 60 days. pH (4.41 ± 0.11 to 2.12 ± 0.02) and titratable acidity (0.54 ± 0.03 to 0.28 ± 0.01) were decreased in the storage period. Overall acceptability was also decreased (8.5±0.02 to 4.1 ± 0.05) after 60 days. T2 (Tulsi: ginger; mint; sugar syrup; lemon juice) (15: 10: 20: 40: 5) revealed the commercial potential for producing good and healthy herbal drink mixes, which will also be useful in supplying the consumer with good nutraceutical potential. The shelf life of the herbal drinks was determined to be interval at 15 days in room temperature; however, after this point, the acceptability decreased. It is suggested that the product be utilised within 15 days by elderly, young, and children.***

Keywords: Herbal drink, Physico - chemical, sensory, sweet basil, microbial

1. Introduction

Since ancient times, medicinal plants have been employed as a source of medication and healing powers. According to the traditional theory of Ayurveda, they have the potential to be used as nutraceuticals and are therefore effective against any sickness or ailment. All around the world, beverages are the most important part of the human diet. All age groups, including young people, adults, and the elderly, enjoy drinking beverages very much (Brag et al., 2018). Due to their perishable nature, fruits, vegetables, and medicinal herbs typically have a relatively short shelf life. They are transformed into prepared herbal drinks in order to preserve them. According to Rathinasamy et al. (2002), an herbal drink is a non - fermented beverage made from medicinal herbs in varying ratios along with sugar, water, and flavourings. Due to the potential detrimental effects of increased soft drink use in recent years, health - conscious individuals have been searching for alternatives in the form of nutraceutical or herbal health beverages (Garg and Ahuja, 2015). Additionally, Sweet basil (*Ocimum basilicum* L.) leaf is an annual crop that is widely grown throughout the world (Vieira et al., 2003) in order to maximise productivity and supply in order to fulfil market demand (Danesi et al., 2008). A very important household herb and medicinal plant, sweet basil leaf is sold fresh, dried, or frozen. Anthocyanins are abundant in the leaves of sweet basil. According to some research, sweet basil is a potent antiviral plant since it is thought to have an inhibitory effect on the human immunodeficiency virus (Szymanowska et al., 2015). Strong antibacterial and, to some extent, antifungal activities can be found in ginger (*Zingiber officinale).* Studies in vitro have demonstrated that ginger's active ingredients prevent intestinal bacteria from growing. Escherichia coli, Proteus sp., Staphylococci, Streptococci, and Salmonella had their growth inhibited. For its ability to decrease cholesterol and blood sugar levels, ginger is also used in Chinese and Japanese medicine (Grzanna et al., 2005). The *Labiatae* family of plants includes the herb mint (*Mentha spp.).* Numerous gastrointestinal diseases can be treated with the mint leaf, according to prior reports. Additionally, mint's antimicrobial, anti - inflammatory, and anti - tumor qualities.

Thus, combining these substances will increase the juices' nutritional value as well as their antibacterial benefits. The study also determined that there are many fruit drinks or herbal beverages depending on the seasonal requirement for an individual and that fruit drinks based on Ayurvedic formulations have considerable medicinal and therapeutic value for an individual. Numerous fruit beverages and Ayurvedic foods are prepared or consumed for people's health. Additionally, one can consider developing a new product through blending in the form of a natural health drink that could also be offered as an appetiser (Hossain et al., 2017).

2. Materials and Methods

The present investigation was carried out in the Department of Food Science and Nutrition in Banasthali vidyapith, Rajasthan.

Collection of material

The fresh and green tulsi leaves were bought from the field, whereas ginger, mint, lime juice (as flavour enhancer) sugar and honey were procured from the local market.

Preparation of tulsi juice

Basil leaves were ground after being rinsed in water to remove contaminants. After adding water, the grinder was run once again. To obtain clear juice, the slurry was run through muslin cloth

Preparation of ginger juice
Ginger of the best possible quality was chosen for the juice production. In order to get rid of contaminants, ginger was cleaned. After that, cutting and peeling were done. Water was added to the mixer as the cut ginger pieces were run through. To extract clear ginger juice from the pulp, muslin cloth was used.

Preparation of mint juice
The market - purchased fresh mint leaves were properly washed and cleaned. Shortening and impurity removal were then completed. Put all the leaves and a small bit of water into the mixer. The clear mint juice was obtained by passing the paste through a muslin Cloth.

Preparation of Sugar & Honey Mix
In order to blend the ingredients more easily, honey was powdered and diluted with distilled water. The final brix was maintained at 16.

Fresh ginger, tulsi and mint were washed, cut in pieces

Mixed in mixer or juicer

Dried in tray dryer at 70^{o}C and powered

20^{o} brix sugar and honey solution was made

Brix of lemon juice measured

Brix of final product kept fixed at 16^{o}

Flavours mixed in calculated proportions

A pinch of salt and citric acid mixed

Heated to 80^{o}C for 20 mins

Store herbal drink (in pre sterilised glass bottles)

Sealed the bottle

Pasteurisation was done at 100° C for 30 mins

Stored at room temperature

Analysis of Storage study (60 days)

Table 1: Formulations of herbal drink

Treatment	Tulsi	Ginger	Mint	Sugar syrup (ml)	Lemon juice
T1	10	10	25	40	5
T2	15	10	20	40	5
T3	20	10	15	40	5
T4	25	10	10	40	5

(Herbal drink will be stored up to 2 months and data will be taken for every 15 days intervals).

Physico - chemical properties
Total soluble solids, Titratable acidity and pH

Total soluble solids were analysed by using Digital refractometer. A drop of herbal drink was put on a refractometer prism and TSS was recorded as °Brix.

- 10 gm of well mixed herbal drink was diluted to 250 ml with boiled water.
- Titration was done with 0.1 N NaOH, 0.3 ml phenolphthalein for each 100 ml of the solution to pink for 30 seconds
- pH was taken by using a pH meter (AOAC, 2005).

Organoleptic analysis
The sensory evaluation of herbal drink was done immediately after preparation for standardizing the best treatment. The prepared herbal drink was stored at room temperature and the sensory evaluation was done. The quality attributes such as colour, taste, and overall acceptance were assessed by a panel of 10 semi trained members who scored on a 9 point Hedonic scale (Ranganna, 2003).

Microbial analysis
Total bacterial count (TBC) and Total mold count (TMC) were analyzed for herbal drinks. Microbial analysis (bacteria and mold) was carried out by using standard procedure of (Biswas and Chowdhury, 2019).

3. Results and Discussions

Best formulation of herbal drink were carried out for further analysis in terms of Organoleptic analysis, Total soluble solids (°Brix), Titratable acidity and pH and microbial analysis for 60 days at room temperature. The changes in physico - chemical parameters of herbal drink during storage at room temperature were formulated in table (given below). The physicochemical parameters such as TSS, acidity, pH, organoleptic analysis and microbial analysis were observed.

Sensory evaluation and standardization of herbal drink
On the basis of organoleptic evaluation (Table 2), the herbal drink prepared by (Tulsi: ginger: mint: sugar syrup: lemon juice) (15: 10: 20: 40: 5) was found to be more acceptable in terms of flavour (8±0.01), colour (8.5±0.02), taste (8±0.01), odour (8.5±0.01) and on overall acceptability (8.5±0.02) over other treatments. When different ratios (40ml) of sugar syrup had been used to partially replace sugars, the organoleptic sensory score improved as a result of the substitution.

Table 2: Sensory score of herbal drink

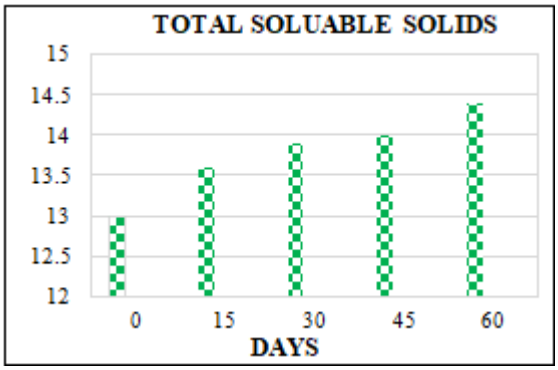
Sensory attributes	T1	T2	T3	T4
Flavour	8±0.02	8±0.01[a]	7±0.02	6.5±0.01
Colour	8±0.01	8.5±0.02 [a]	7.5±0.01	6±0.01
Taste	7.5±0.02	8±0.01 [a]	7±.0.01	6.5±0.01
Odour	7.5±0.01	8.5±0.01 [a]	7.3±0.01	6±0.02
Overall acceptability	8±0.02	8.5±0.02 [a]	7±0.02	6.5±0.02

Data are significant at ($p<0.05$) Results were shown as mean ± standard deviation

Physico - chemical properties

Total soluble solids, Titratable acidity and pH of standardized herbal drink at room temperature

The change was observed in TSS content show in figure 1 of the samples during storage, (13.0 ± 0.14) BX TSS was observed for fresh herbal drink and (14.4 ± 0.4) BX for room temperature stored herbal drink at 60 days respectively. The hydrolysis of polysaccharides into monosaccharides and oligosaccharides may be the cause of the considerable increase in TSS with the passage of storage time. The findings of the current study agree with the results reported by (Majumdar et al.2011) in the blended juice made from bottle gourd and basil leaves reported an increase in total soluble solids after storage at room temperature and low temperature in pineapple juice blend with carrot and orange juice. It was observed that significant variation occurred in titratable acidity and pH of fresh juice (0.54 ± 0.03), at 0 day and pH (4.41 ± 0.11) as compared to the stored herbal drink after (0.28 ± 0.01) and (2.12 ±0.02) 60 days. According to (Sasikumar et al.2013), the decrease in pH was caused by an increase in titratable acidity, which has an impact on the organoleptic quality of juice. Yadav et al. (2010) reported similar results. In the past, (Sandhu et al.2001) recorded increasing trends in acidity with lengthening storage periods.



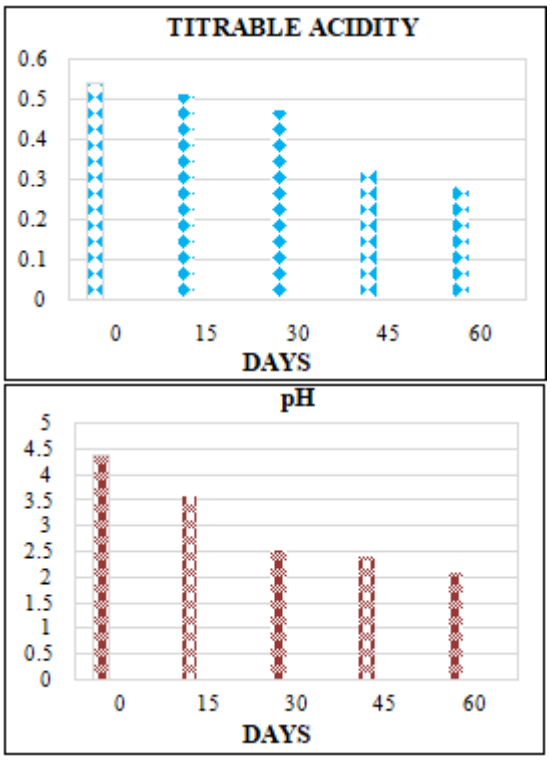


Figure 1: Physico - chemical properties in herbal drink

Organoleptic analysis

The data presented in table 4 showed that the sensory characteristics of the sample that had been stored at room temperature (27–28 ^{o}C) for 60 days changed. Organoleptic attributes were seen to change at intervals of 15 days. It was observed that fresh beverages scored the highest score in terms of overall acceptability (8.5±0.02) as compared to stored herbal drinks (4.1±0.05) respectively. The rate of other attributes of fresh herbal drink as flavour (8±0.01), colour (8.5±0.02), taste (8±0.01), odour (8.5±0.01), were also decreased (4.1 ± 0.18), (4.5 ± 0.12), (3.5 ± 0.05), (3.9 ± 0.08), in terms of flavour, colour, taste and odour when compared to the stored herbal drink at 60 days respectively. But the acceptance rating was slightly lower. (Kumar, 2018) showed similar results while preserving a low - calorie beverage.

Table 3: Organoleptic analysis of herbal drink

	0	15	30	45	60
Flavour	8±0.01^{a}	7.1 ± 0.14^{b}	6.5 ± 0.08	5.2 ± 0.11	4.1 ± 0.18
Colour	8.5±0.02^{a}	7.5 ± 0.21^{b}	6.4 ± 0.05	5.1± 0.12	4.5 ± 0.12
Taste	8±0.01^{a}	7.8 ± 0.22^{b}	6.5 ± 0.02	5.1 ± 0.14	3.5 ± 0.05
Odour	8.5±0.01^{a}	7.3 ± 0.11^{b}	6.5 ± 0.02	5 ± 0.05	3.9 ± 0.08
Overall acceptability	8.5±0.02^{a}	7.5 ± 0.12^{b}	6.5 ± 0.02	5.2 ± 0.04	4.1 ± 0.05

Data are significant at ($p<0.05$) Results were shown as mean ± standard deviation

Microbial analysis

Total bacterial count and mould count for standardised herbal drink were examined. TPC showed up increasing in the sample over a period of time. Table 5 provides an overview of the data obtained about the microbial load. Under room temperature conditions the total bacterial count and total mold count of fresh beverage samples were 6×10^{-6} CFU/mL, 2×10^{-6} CFU/mL. The total bacterial count increases through the duration of the storage period up until, after 60 days, the herbal drink has too many bacteria to count. At 60 - days of storage, the herbal drink had a total bacterial count and mould count were 85×10^{-6}CFU/mL and 90×10^{-6} CFU/mL. The total number of viable count was not uniform, according to previous findings by (Jain et al., 2011). Furthermore, it revealed that as storage time was extended, the overall colony count slightly increased.

Table 4: Microbial analysis of herbal drink at room temperature

Storage period (days)	Total bacterial count	Total mould count
0	6×10^{-6}	2×10^{-6}
15	17×10^{-6}	14×10^{-6}
30	29×10^{-6}	30×10^{-6}

45	45×10^{-6}	78×10^{-6}
60	85×10^{-6}	90×10^{-6}

Data are significant at ($p<0.05$) Results were shown as mean ± standard deviation

4. Conclusion

According to the study's findings, an herbal drink containing 15% basil extract and the following proportions of tulsi, ginger, mint, sugar syrup, and lemon juice was acceptable. The quality of the herbal drink for consumption only remained acceptable for 15 days after it was prepared, according to sensory evaluation, and after 60 days of the study, significant changes were seen in the physicochemical characteristics. The microbial research also revealed that the bacteria and mould in herbal drinks grew more rapidly over the storage period. On the basis of the results mentioned above from the current study, it can be concluded that the formulation of herbal drinks can fulfil customer taste and preferences. By including and optimising the consumption of medicinal plants in foods and drinks, a person can obtain all the health benefits and lower their risk of developing serious conditions like diabetes and other cardiovascular illnesses.

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