



Development of Instant Tea Premix Bags Using Indigenous Spices and Its Sensory Evaluation Among Working Professionals

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Abstract

Background: Herbal tea is one of the herbal drinks that has been widely consumed by many people since ancient times and known as tea that have functional properties, one of them is source of antioxidants. Antioxidants can be obtained from a lot of sources, such as the mixture of cardamom, cinnamon, and cloves. The use of cinnamon and clove expected to increase the consumers' preference towards this tea. Instant tea consumption continued to increase since 2018. Total tea consumption increases nearly 5 percent i.e. 4.84 million tonnes, which was underpinned by the rapid growth in per capita income levels, particularly in China, India and other emerging economies.

Objectives: This research aims at development of instant tea mix bags and to study the consumer perception of the developed instant tea.

Methods: Raw material procurement, formulation of premix, preparation of tea bags and its sensory evaluation are the major steps involved. The experimental design used in this research was analyzed using descriptive and multivariate statistical analyses. First, the characteristics of respondents was calculated through cross tabs with Pearson Chi-square test. Secondly, the result of the sensory evaluation of the sample tea bags was analyzed by t-test.

Results: The results show that the addition of indigenous spices showed a significant difference. The ANOVA results reveal that the calculated F value is greater than F tabulated value at 5% probability. From the study conducted it can be concluded that colour and taste are major attributes for standardizing the formulation based on sensory properties. Tea solids to masala mix ratio of 3:2 can be considered acceptable to optimize the premix based on sensory attributes. Premixes has the significant amount of anti-oxidant capacity based on the data obtained we can also position these premixes as healthy beverages in the market rather than just refreshing beverage. Result shows overall acceptability of sample 4 i.e. mixture of cinnamon, clove and tea powder is more than other three samples. Sample 4 premixes are more preferable because of its healthy properties also. The result obtained by this research can be used for optimization of the best formula so maximum points can be known.

Keywords : Tea, premix, value addition, spices, health.

Introduction

When we take a look into consumer preference and consumption over tea, it has been found that in the western countries, black and green tea bags are common, whereas, in India, Pakistan and middle eastern countries with ongoing development, people prefer loose tea. In Asian countries, tea leaves are brewed 3–4 times, whereas in western countries tea bags are used once and discarded. In mixed herbal tea, correct amount of herbs (with similar particle size) are added in the tea bag and no scooping is required. In India, demand for tea bags is increasing because of high purchasing power of the consumers (**Bassi *et al.*, 2020**). Spiced and formulated food products are purposely used these days for health benefits and are largely promoted for daily use. In light of this, tea bags and premix instant tea are easier to handle as multiple tea particles in a single bag with equal distribution are of great help.

Blending of herbs, spices and other plant material can be done in the tea bags. Herbs used in infusions or tea bags have mild medicinal or digestive properties which when used in correct amount (dosage), provides dual purpose that is safety from over and under dose and convenience to the patient. The nutritional quality of tea bag paper also gets enhanced by spraying extract of green tea on black tea bag paper during short-term storage. Infusions prepared from different herbs are blended with the tea in bag to increase the phenolics in diet (**Sarkhel *et al.*, 2022**). According to the European medicines agency, herbal teas (bags) contain one or more herbal substances by decoction, infusion or maceration which used for oral consumption. Fresh and dried herbs have been since centuries for making medicinal herb infusions and refreshing drinks.

Instant tea is of great interest to the general public, medicinal and nutritional experts, and health and food science researchers to know the antioxidant capacity and constituents in the food we consume. Health advantages of diets rich in antioxidants include lowering the risk of cardiovascular diseases, certain cancers and natural degeneration of the body associated with the aging process. Instant teas are produced from black tea by extracting the liquor from processed leaves, tea wastes, or undried fermented leaves, concentrating the extract under low pressure, and drying the concentrate to a powder by freeze-drying, spray-drying, or vacuum-drying. Low temperatures are used to minimize loss of flavour and aroma (**Purkait *et al.*, 2023**). Instant green teas are produced by similar methods, but hot water is used to extract liquor from powdered leaves because all instant teas absorb moisture, they are stored in airtight containers or bottles.

These value added premixes are once put into liquid form and the amount of nutrients is said to be the same as the brewed green tea. On the other hand, green tea powder is simply fine powder of loose leaf teas that you can take in the nutrients of the whole leaf. Nowadays, due to busy schedules and hectic lifestyle, many people have started to trust on ready-made food products, increasing the popularity of instant tea market in upcoming years. With added health benefits of instant tea such as fat reduction, antioxidants, and headache and various components such as cardamom, ginger, basil, clove, etc. are proven to be fit for health (**Wani *et al.*, 2022**). This key factor is anticipated to increase the growth of instant tea premix

market in forecast period. Increasing trade values in emerging economies is also projected to increase the growth of instant tea premix market in upcoming years.

Literature Review

One of the factors affecting the antioxidant status and the content of bio-active compounds in tea infusions is their enrichment with various additives and consumption in the form of blends and chemical composition. Additives to teas are often herbs, flowers and spices. Thus, (**Janda et al., 2018**) with their aim to determine the content of polyphenols, fluoride and antioxidant potential in infusions and to examine the correlation between these parameters was justified by them. The study indicated that the spices and fluoride content affects the antioxidant properties of infusions and their content of polyphenols. High fluoride levels decrease the antioxidant capacity of tea infusions. (**Peter et al., 2012**) discussed the definition and classification of herbs and spices. They also discussed the trade of spices and, in particular, the role of India. The applications of different spices in medicine, the food and beverage industry (including health foods), cosmetics, perfumery and nutraceuticals were summarized. The use of spices as a source of natural colour, flavouring, antioxidants and antimicrobials was brought to notice. The article highlighted over the importance of producing high quality, clean spices, by minimizing the use of chemical fertilizers and pesticides. Tea is one of the most prevalent and commonly consumed beverages worldwide due to its attractive flavor and taste. Tea consumption has also been claimed to be associated with beneficial health effects. Systematic scientific studies by (**Dubey et al., 2020**) have proposed the beneficial effects of regular use of tea on modulating the initiation and propagation of cardiovascular diseases and carcinogenesis. Ready-to-drink (RTD) tea is a ready prepared tea, mostly black or green, and generally consumed as hot and cold preparations. With the increased market focus on health and wellness, it is expected that the nonalcoholic beverage market will be a foundation of expansion and development in the coming years. One of the problems is the low prices of low grade and tea waste (refuse tea). Therefore value addition is needed to couple with other strong consumer requirements and expectations such as beneficial health to consumers, convenience and sensory satisfaction, etc. According to the result of market survey bottled ready to drink, tea product should be available at the market which can be served in cold condition. Ready to drink tea can be formulated which compatible with consumer requirement is using the low- grade tea and refuse tea with a shelf life of one month. Thus this is one of the best value added quality low grade tea ready to drink from dust, broken mixed, refuse tea which can be achieved by using the above specification. (**Sangma et al., 2023**) Highlighted the fact that tea is a popular beverage that is drunk by the majority of people globally. While tea normally lacks macronutrients like carbohydrates and micronutrients like vitamins and vitamins, incorporation of seaweeds will help in the enrichment of those nutrients in tea. Thus, seaweeds inclusion in diet may also help to alleviate health issues caused by protein, mineral, and carbohydrate shortages. Spices are a rich source of vitamins, polyphenols, proteins, dietary fiber, and minerals such as calcium, magnesium, iron, and zinc, all of which play an important role in biological functions. Since ancient times, spices have been used in our kitchen as a food coloring agent. Spices like cinnamon and turmeric allegedly contain various functional ingredients, such as phenolic and volatile compounds. Therefore, this

review by (Kumar *et al.*, 2023.) summarized the current knowledge about the nutritional profiles of cinnamon and turmeric, as well as to analyze the clinical studies on their extracts and essential oils in animals and humans. Furthermore, their enrichment applications for food products and animal feed have also been investigated in terms of safety and toxicity. Numerous studies have shown that cinnamon and turmeric have various health benefits, including the reduction of insulin resistance and insulin signaling pathways in diabetic patients, the reduction of inflammatory biomarkers, and the maintenance of gut microflora in both animals and humans. The food and animal feed industries have taken notice of these health benefits and have begun to promote cinnamon and turmeric as healthy foods. This has resulted in the development of new food products and animal feeds that contain cinnamon and turmeric as primary ingredients, which have been deemed an effective means of promoting cinnamon and turmeric's health benefits. (Shaik *et al.*, 2023) discussed that nowadays, research on herbal drinks receives less attention, resulting in a lack of understanding regarding their benefits. The information on physicochemical (total soluble solids, pH, titratable acidity), phytochemicals (flavonoids, tannin, phenolic acids, curcumin, terpenoids), and pharmacological properties (antioxidants activities, antibacterial, antimicrobial and antifungal activities) of herbal drinks were discussed. The herbs and their processes employed in the preparation of herbal drinks are predicted to have a significant impact on their physicochemical, phytochemical, and pharmacological properties. In addition, the phytochemical components present in the herbs are expected to influence the pharmacological properties of herbal drinks. Ultimately, herbal drinks have the potential to be commercialized and be served as healthy drink products with numerous health benefits and appeal to people to consume herbal drinks.

Methodology :

Primary Processing and Sample Preparation

Tea solids, encapsulated spices (cardamom, cinnamon, and cloves) were the ingredients used for making the instant tea premix. The amount of spices and tea leaves used for the tea bags was weighed on a weighing machine and then required spice ratio was prepared separately (Table 3.1) and then later all other ingredients along with prepared spice mix were blended.

SAMPLE 1- Cardamom(1.5g)+ cinnamon (1g)+clove(1.5g)

SAMPLE 2-Cardamom(2g)+ cinnamon (2g)

SAMPLE 3-Cardomom(2g)+clove (2g)

SAMPLE 4-Cinnamon(2g)+ clove(2g)

Table 3.1 Details of variables/ parameters, their level and descriptions

S. No	Spices	Percentage (%)			
		S1	S2	S3	S4
1	Cardamom	15	20	20	-
2	Cinnamon	10	20	-	20
3	Cloves	15	-	20	20

Formulation of Instant Tea Premix

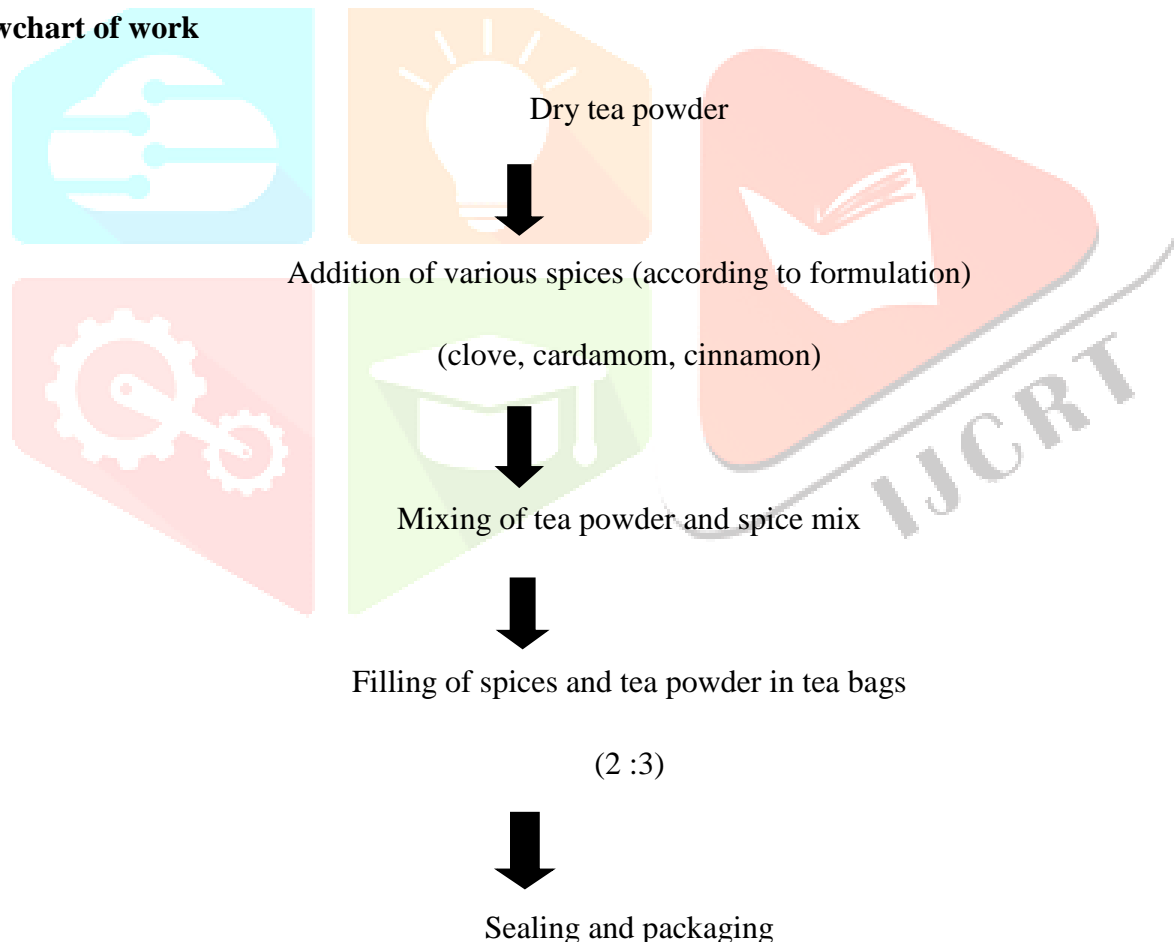
Formulation of Instant tea premix was done by using tea solids, warm water, grounded spices (cardamom, cinnamon and cloves). The experiment was divided into four groups on the basis of quantity of tea solids and spice mix percentage at ratio 3:2. However total quantity of mix was made to ten gram by varying the proportions of other ingredients. The material used for packaging of premix tea leaves and spices (Low Density Polyethylene). The product was packed at room temperature and was sealed by using a heat sealer provided in the food laboratory.

Table 3.2: Formulation table

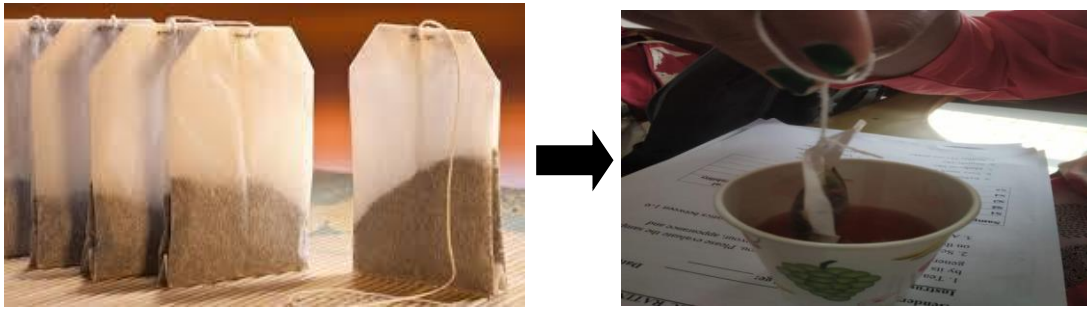
Ingredients Ratio of proportion in percentage (%)

S. No.	mix	S1	S2	S3	S4
1	Tea Solids	6g	6g	6g	6g
2	Masala mix	1.5g+1g+1.5g	2g+2g	2g+2g	2g+2g

Flowchart of work



Developed Instant spices tea premix bags of 10g. was extracted with hot water (100 ml).



Sensory Evaluation

Sensory evaluation of premix in respect of color, flavor, taste and overall acceptability was done by semi-trained persons including staff and research scholars from a private university. Evaluation was done using 9-point hedonic scale. Sensory evaluation was done to select the best formulation among the three and standardize the product.

The participants in the study were chosen based on age and sex. Questionnaires were given to the respondents, and they were asked to describe colour, flavour, taste, appearance and overall acceptability of the samples. Questions related to demographics, occupations, weather conditions, type of preference of tea and time of consumption were answered by the respondents.

Testing Of Instant Tea

Determination of total phenolic content

Briefly 0.5 ml. of powder extracts was dissolved in 35 ml. distilled water and then mixed with 10-fold diluted FolinCiocalteu reagent (2.5 ml) and 7.5 ml of 20% sodium carbonate solution. Thereafter, volume was adjusted to 50 ml. with distilled water and kept for 2 hr. ($23\pm 2^{\circ}\text{C}$) at room temperature. Then, 2 hrs. of samples absorbance were taken at 765 nm. using UV-spectrophotometer. TPC of each fraction was expressed as mg Gallic acid equivalents/100 g dry weight.

Statistical analysis

Data was analyzed using descriptive and multivariate statistical analyses. First, the characteristics of respondents was calculated through cross-tabs with Pearson Chi-square test. Secondly, the result of the sensory evaluation of the sample teas bags will be analyzed by t-test.

Results and Discussion:

The different respondents on the basis of gender, age, educational background participated in this study. Questionnaires were distributed to participants for the sensory analysis of the prepared instant tea bags. The result based on the sensory evaluation (Table 4.1) showed the respondent indicated that formulation has the highest overall acceptability for sample IV, which has the formulation as tea solids 10%, tea masala 15%, , water 30%. Overall acceptability of sample IV was at par with that of sample II (scoring 7 point on hedonic scale) and significantly superior over that of sample I and III(scoring 6 point on hedonic scale). Sensory score for colour showed that sample II has the highest score for colour that is (8 point on the hedonic scale). Score of colour is in order II>IV>I>III formulation was at par with that of sample IV

and I (7 point on the hedonic scale) and significantly superior over that of sample III (6 point on the hedonic scale). Sensory score for flavour showed that sample IV got the highest score of 8 followed by sample II which got the score of 7. This has the order IV>II>I>III. Sensory score for the taste is as follow for sample II and sample IV has score 8, III-7, I-6. Score says that sample II and IV was at par with that of sample III and significantly higher than that of sample I. Hence sample IV is standardized based on sensory attributes completing our first objective.

Table.4.1: Sensory evaluation of prepared instant tea premix

Sample	Colour	Taste	Flavour	Appearance	Overall Acceptability
SAMPLE 1	7	6	6	7	6
SAMPLE 2	8	8	7	5	7
SAMPLE 3	6	7	5	6	6
SAMPLE 4	7	8	8	6	8

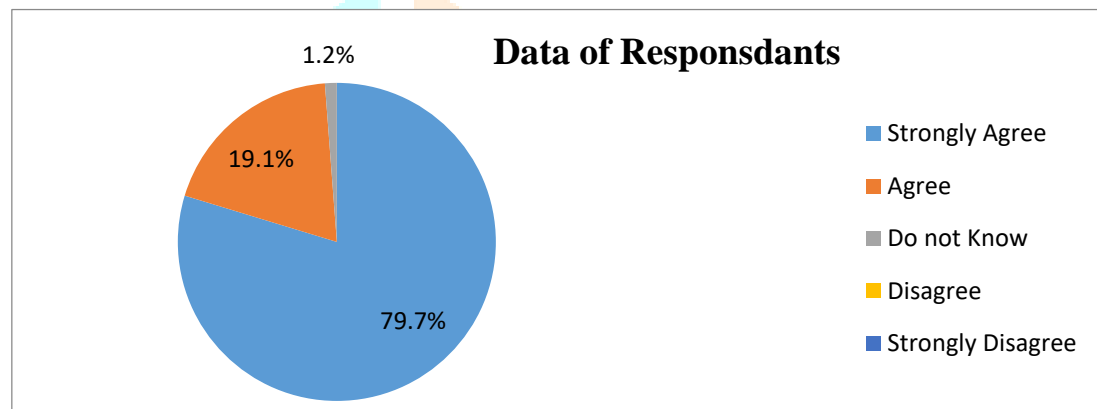


Fig 4.2.4.Data Respondents of Sensory Evaluation for Sample 4

As per the investigation following result, best results were seen in Sample 4 as, Total number of people 92 respondents; 79.7% respondents are strongly Agree, 19.1% are Agree and 1.2% are responded as Do not know, 4.4% responded as disagree and 0% people for Strongly disagrees. The evaluation was done on the basis of People responses to the particular sample.

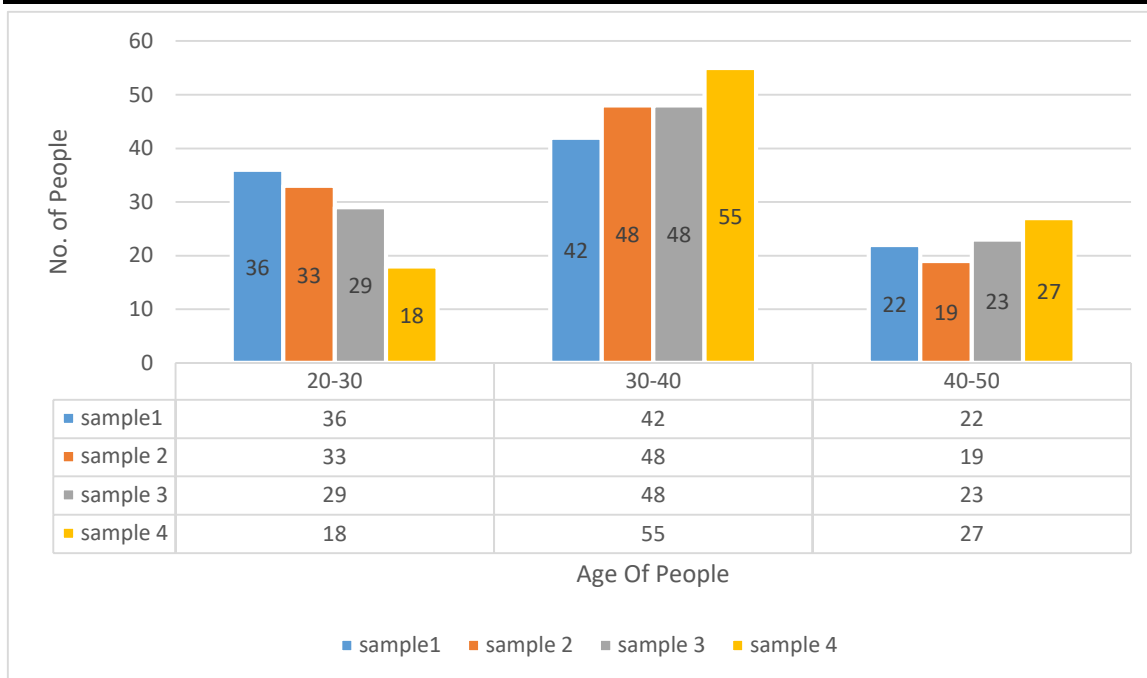


Fig 4.3. On the basis of age, the investigations showed that around 92 respondents were considered. Blue colour represents the No. of respondents whose age was between 20-30, Red colour represents whose age was between 30-40, Green colour represents whose age was between 40-50. From the table, the preferences of sample are known on the basis of Age. The people who are aged between 30-40 mostly prefer all the types of samples.

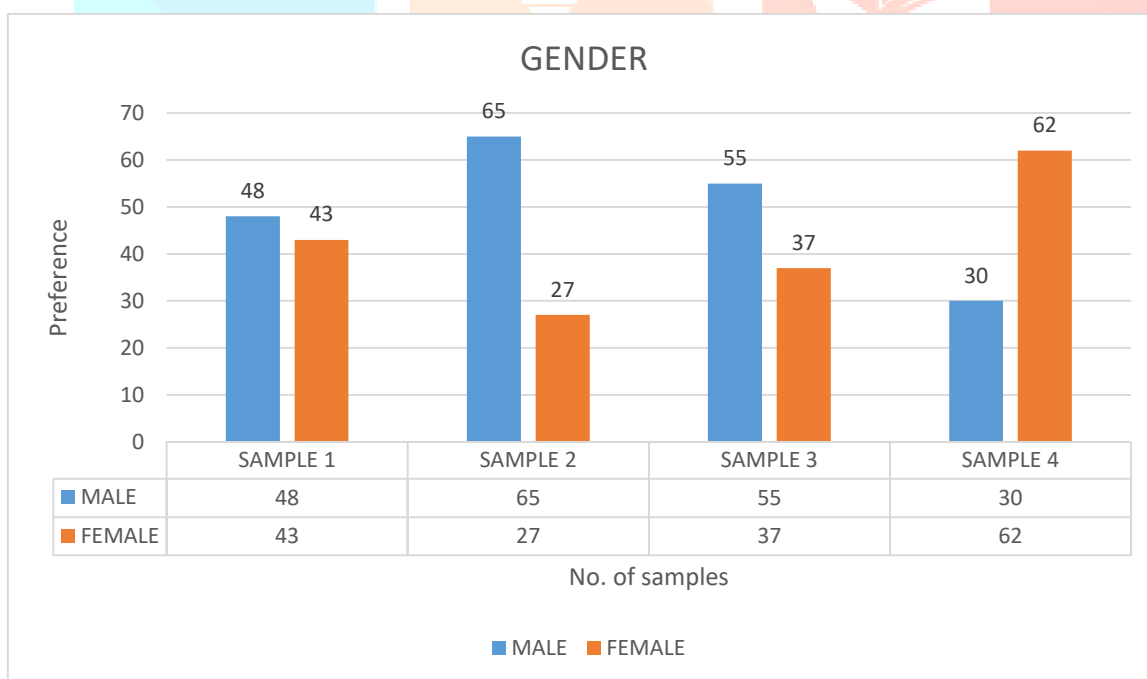


Fig 4.4. As per the investigation following results were being carried out for gender descriptive studies where, Total number of respondents were 92 people. From the Fig 4.4, the preference was as followed- Sample 1 (Male-48, Female-43), Sample 2 (Male-65, Female-27), Sample 3 (Male-55, Female-37) and Sample 4 (Male-30, Female-62).



Fig 4.5 Since, the evaluation was done in an university, therefore the investigation all the samples were mostly preferred by the students due to the fact that students are more health conscious.

Summary And Conclusion

Nowadays tea bags are more preferred over loose tea especially on the workplaces as they have many advantages over loose tea. They can be easily disposed-off, are convenient, saves time and is available in a number of flavors which can be blended in small tea bags and can provide various health benefits and refreshes the mind in a hectic schedule. In addition, one can carry a tea bag with him/herself at anyplace whereas loose tea is difficult to prepare immediately. Hence, the quality in terms of both packaging and nutrition provided by the teabags should be considered by the tea beverage industries so that it provides profit to the consumers as well as provides satisfaction to the consumers. From the study conducted it can be concluded that colour and taste are major attributes for standardizing the formulation based on sensory properties. Tea solids to masala mix ratio of 3:2 can be considered acceptable to optimize the premix based on sensory attributes. Premixes has the significant amount of anti-oxidant capacity based on the data obtained we can also position these premixes as healthy beverages in the market rather than just refreshing beverage. Result shows overall acceptability of sample 4 i.e. mixture of cinnamon, clove and tea powder is more than other three samples. Sample 4 premixes are more preferable because of its healthy properties also.

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