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Production of Fruit Powders and Formulation of Instant Probiotic Fruit Powders Mix

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ABSTRACT: Indian climate has diverse suitable for availability of all varieties of natural fruits & vegetables and which are perishables. The main aim of this work is to prepare the dried fruit powder mix with the addition of probiotic bacteria without loss of natural properties. Drying (dehydration) is the widely used classical methods for preservation of agricultural products. Two drying methods (solar and oven) were used to dry the Apple, Mango, Orange, Sapota and Grapes. The Grapes took high time 10 days (240 hrs) and 6 days (144 hrs) time was required for remaining four fruits drying with both methods. Proximate analysis of solar dried and Hot air oven dried fruits powders, Sapota fruit powder having highest content of protein (0.92%, 0.89%), fat (1.1%, 1.3%), carbohydrates (25%, 31%) and calcium (15.3mg/100gm, 14.9mg/100gm) compare to other fruit powders. With respect to the microbiological parameters of dried powders, we acquire results meeting the limits set by the ISO standard which make sure the microbiology of the food chain. Based on sensory evaluation of individual fruit powders total 10 formulations were made and the F5 of hot air oven method was taken for further preparation of instant probiotic fruit powder mix. Isolated and purified *Lactobacillus casei* shirota from Yakult Probiotic milk and added the 10^7 cells into final best formulation. The proximate values of final formulated Probiotic fruit powder mix sample have remained same. Finally, it was proven that Probiotic bacteria does not influence the probiotic fruit drink mix in sensory evaluation and proximate values of final product. The method of Hot air oven drying in view of the results attain proves to be the one that boosts the good properties of all fruit powders in final best formulation.

Keywords: Oven; Solar dryer; Sensory evaluation; Proximate & Microbial analysis; *Lactobacillus casei* shirota.

INTRODUCTION

Diverse climate of India makes sure availability of all varieties of fresh fruits & vegetables. India holding second rank in fruits and vegetables production in the world, after China. Sapota, Manilkara achras (Mill.) is one of the most important tropical fruits belonging to the family sapotaceae. Sapota produced largely in India followed by Mexico, Guatemala and Venezuela. In the past 10 years sapota crop cultivation tremendously increased over 136 percent.

Fruits like Mango (*Mangifera indica* L.) belongs to Anacardiaceae family (Barreto *et al.,* 2008) having rich sources of carbohydrates, vitamin B1, B2 and C and also having an abundant supply of antioxidant sources like provitamin A, beta-carotene, which is very beneficial for humans. It is a tropical fruit cultivating worldwide consumed as fresh as processed form (Corzo and Álvarez, 2014). Oldest fruit like Apple (Malus domestica Borkh.) is known to mankind and has high nutrient source. Apple having plentiful vitamins, minerals and fiber source and is usually consumed raw, in spite of that, many foods (especially desserts) and beverages are produced with this apple (Aghbashlo *et al.,* 2010; Antal and Kerekes 2016; Shalini and Gupta, 2010).

Concerning to the grapes are more favorable for microbial spoilage during storage, even under refrigerated conditions with psychrophiles, in view of the fact that it has high moisture contents (80% -85% wet basis). Sweet orange (c. sinensis) is a member of the Rutaceae family and Aurantioideae subfamily found in country Nigeria, South African and other tropical and subtropical regions of the world (Etebu and Nwauzoma, 2014).

Food losses occurring majorly from 50% of the fruits and vegetables produce and 25% of harvested food grain in developing world (Burden and Wills 1989). Food preservation can save and minimize the loss of a harvest surplus. In food preservation drying is common practice following from ancient time. Drying removes the maximum moisture which produce lighter, smaller, and less likely to spoil. Among the drying solar energy is the very useful, appealing and ample form of renewable energy sources for the reason that it is free, environment friendly and accessible throughout the year. The most usable form solar energy is to convert it into heat. According to Hawlader *et al.,* (2006) solar drying is the most captivating methods used to conserve the many fruits and vegetables.

Large numbers of hot air dryers with connection are the most commonly used to dry out the agricultural products. With this convective dying heat will be passed through the heat and mass transfer phenomenon and maximum moisture will be removed from the content of the material. In this process, the two forms of moisture i.e internal vapour evaporation and surface evaporation will occur. Water will come out from inside of the food product into the air and product interface by diffusion and from the interface to the air stream by convection (Sahin and Dincer 2005).

As defined by FAO/WHO (2001), probiotics are live strains (mainly bacteria and few yeast) that consult an advantageous heath effect on the host if deliver in suitable amounts. Probiotic organisms are diversly present in Fermented milk products and these are excellent carriers; however, the milk-based products usage was reduced because of lactose-intolerance, allergies, and vegetarianism. Hence, in recent time several raw materials have been determine if they are appropriate substrates to produce novel non-dairy functional foods (Vasudha and Mishra, 2013). Commonly, fruits and vegetables are plenty amount of carbohydrates, dietary fibers, vitamins minerals, polyphenols and phytochemicals; and these are known as healthy foods (Sutton and Zealand 2007). In many publications various fruit and vegetable juices, such as tomato, mango, orange, apple, grape, peach, pomegranate, Watermelon, carrot, beet root and cabbage as a raw material are more suitable for the production of probiotic juices and relevant beverages. *Lactobacillus acidophilus, Lb. helveticus, Lb. casei,* etc., are most commonly employed probiotics (Nagpal *et al.,* 2012; Patel, 2017).

We found several fruit powder drinks in the market without probiotic bacteria and less literature is available about the formulation of different fruit juice powders that to its about only drying process not the powder formulation products. However, fruits powder is available but there is no nutrient study is also conducted on these as per the recent literature, with this it has been decided to do research on these aspects by including the probiotic bacteria through several standardization protocols. To address this knowledge, gap a research problem has been identified entitled "Production of instant fruit powders and formulations for fruit drinks".

MATERIAL AND METHODS

Raw materials: Apples, Grapes, Mangoes, Oranges and Sapotas fruits were purchased from the local market Bodhan. Probiotic Yakult milk was used for isolation of *Lactobacillus casei* strain Shirota for adding to the fruit powder mix.

Packaging materials: Packaging material such as glass jar bottles, low density polyethylene (200 guage) and high-density polyethylene (300 guage) were used for fruit powders and final formulated mixed fruit powder product.

Preparation of fruit powders: Preparation of fruit powders through solar drying: there several steps involved in the proper drying through solar energy for all the fruits. Proper cleaning, peeling, cutting was done for all the fruits for quick drying in both methods of drying.

Drying of fruits: The cut pieces of fruits were placed in trays or racks of driers. The fruits pieces were dried in solar dryer and hot air oven. The temperature of drying in the solar dryer varied daily from 22°C to 80°C based on solar energy. The hot air oven temperature of drying was fixed at 50°C and dried at different timing exposure according to fruit.

Grinding: Dried fruits pieces were grinded into fine powder. This powder was sieved with different sieves for making the fine powder.

Packaging: The fruit powders were packed in air tight glass jar bottles for storage and for further analysis for preparation product.

Blending: Blending of all fruit powders were done according to the formulation which was prepared based on sensory evaluation of the individual fruit powder.

Making of formulation for different fruit powders: The fine fruit powders were diluted in ten times (i.e. one gram of fruit powder in ten milliliters of water) in sterile mineral water. Then we conducted sensory evaluation of each single fruit powder and based on the results, we made the formulation of mixed fruit powder.

Biochemical analysis of fruit powders: Estimation of Moisture: Moisture was done by oven drying method (AOAC, 2005). In oven drying method, the sample was heated under mentioned conditions and the loss of weight was used to calculate the moisture content of the sample. Weigh the empty Petri dish as (W1). Note the weight (Petri dish + sample) (W2). Weigh the sample (dried sample + Petri dish) (W3). Calculate the moisture percentage by the following formula.

Moisture (%) = W2-W3 / W2-W1 × 100

Protein content estimation by micro-kjeldahl method: The protein content was estimated by Kjeldahl AOAC method (2005).

N g/Kg = (ml of HCL – ml blank) × Normality × 14.01) Weight

Estimation of Fat in fruit powders: Fat was estimated from crude ether extract of the dry material by AOAC (2012). The (5 –10g) dry sample were taken accurately into thimble & plugged with cotton. Anhydrous ether was used for extraction of fat from the thimble under Soxhlet apparatus for about 4hrs. The ether extract was filtered into a already weighed fat conical flask. The ether was removed by evaporation and flask with the residue dried in an oven at 80-100°C cooled in a desiccator and weighed.

Fat content (gm /100 sample) = Weight of ether extract × 100 Weight of the sample (equivalent to fresh sample taken)

Estimation of Ash content in fruit powders: The 5g of very fine ground sample was taken in pre-weighed silica crucible and ignited till smokeless at 550°C for 4 h for complete oxidation of organic matter in muffle furnace and removal of moisture and finally leftover matter ash content was calculated (AOAC, 2012).

$$\text{Ash content (\%)} = W_3 - W_2 \times 100\ W_1$$

Where as W1 = weight of sample

W2 =weight of crucible

W3 = weight of crucible after combustion

Estimation of Total carbohydrates in fruit powders by anthrone method: Dilute hydrochloric acid when react with carbohydrates were first hydrolyzed into simple sugars in hot acidic medium glucose was dehydrated to release hydroxymethyl furfural. This compound having grey colored forms with anthrone with an absorption maximum at 630nm by Hedge and Hofreiter, (1962**).**

Calculation Amount of carbohydrate present in 100mg of the sample = (mg of glucose ÷ Volume of test sample) × 100

Estimation of Minerals (dry ash solution): Small amount of glass distilled water (0.5-1.0 ml) was added to the ash and then added 5 ml of distilled HCL. The mixture was dried through evaporation under boiling water bath. Similarly, this was carried out up to 3 times and filtered through whatman No. 40 filter paper into a 100 ml volumetric flask. Cooldown the filtrate solution made up to 100 ml and required amounts was used for assessment of phosphorus, iron and calcium according to Raghuramulu *et al.*, (2003).

- 1 ml of 0.0 IN KMn04 = 0.2004 mg of calcium, If the normality of standard KMn04 solution was not exactly O.OIN, the following formula can be used.
- Calcium mg/100 g = Titre value × 0.2004 × Total volume of ash solution ×100 Volume taken for estimation × Wt. of sample

Microbial Analysis of Fruit powders: Microbial analysis of samples particularly bacterial, fungal load was observed through plate count method. Serial dilution and plate count procedures as described by Adegoke (2004); Hasanuzzaman *et al.*, (2014) was used with slight modifications. The media used for bacterial count is nutrient agar media (NaCl (5 g), peptone (5 g), Beef extract (3 g), agar agar (18 g) / 1 liter and for mold count is potato dextrose agar (PDA medium). Then, 1 gram of each sample was serially diluted sample and spread plated on NA, PDA plates. The plates were then kept for incubated until growth occurs. After incubation the cfu/ml count was calculated with the following formula

$$\text{CFU/ml (n)} = y/dv$$

Where as

Y= Total number of colonies

D= dilution used

V= volume plated

Isolation and purification of *Lactobacillus casei* shirota on two mediums from Yakult probiotic milk. Probiotic milk Yakult was used for the isolation of Lactobacillus spp. on MRS agar and Nutrient agar plates by using spread plate method. Initially, 1 mL of probiotic milk sample was serially diluted up to 10^{-9}. Then, 0.1 mL aliquots of the diluted samples from 10^{-3} to 10^{-5} were spread plated on MRS agar and Nutrient agar plates. All the plates were incubated at 37°C for 24-48 hrs. After incubation enumerated the colonies and individual common colonies were selected and purified with streak plate technique. The purified bacteria were identified based on its colony morphology, cell morphology and presence of common load in the sample and further used for experimentation.

Growing of *Lactobacillus casei* in milk for addition final fruit powder mix: The sterilized milk of 50 ml was taken into conical flask and added the 2 loopful of purified probiotic colony. Then milk kept at 37 for 12-24 hrs in shaking cum incubator.

Checking of viable cell count of *Lactobacillus casei* in milk: The viable cell count of *Lactobacillus casei* shirota in milk was performed by total plate count method. In this process we conducted one ml of milk taken into 9 ml of sterilized water and made the dilutions up to 10^{-6} and last 3 dilutions were spread plated in nutrient agar plates and incubated at 37°C for 24-48 hrs. After incubation the viable colonies were counted in each dilution.

Centrifugation of Lactobacillus culture for addition to fruit powder mix and Preparation of formulations with probiotics: The multiplied *lactobacillus casei* milk was centrifuged at 2000 rpm for 5 minutes. Then the cells were formed in pellet and this pellet was diluted in one ml of sterilized water. The cell diluted water was added in final 50gm of formulated fruit powder mix and placed it in laminar air flow chamber for drying.

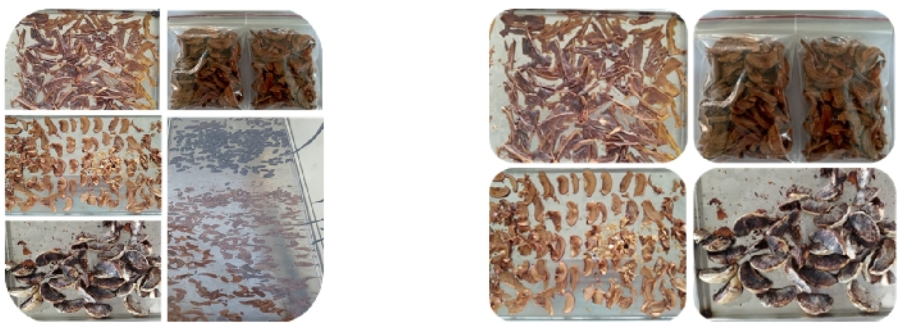
Sensory analysis of instant fruit powder mix with probiotics: The sensory evaluation of prepared samples was done with a 10-member trained scientific committee comprised of under graduate students and college staff members who had been some previous vast experience in sensory evaluation. The panel members gave the judgment through rating products on a 9 points Hedonic Scale with corresponding illustrative terms ranging from 9 'like extremely to 1 'dislike extremely. The format for sensory evaluation card were followed by Meilgaard *et al*., (1999).

RESULTS AND DISCUSSION

Production of fruit powders through Solar drying and Hot air oven methods:
Among the five fruits dried, the drying time for grapes were high that took 10 days (240 hrs) and remaining four fruits such as apple, mango, orange, sapota were dried within 5 days in solar drying method. High time was required due to grape seed coat thickness and other factors were also there. The peel of the grape plays a critical role in controlling the drying process. Grape peel consists of a wax layer as a protective barrier against fungal pathogens (Fava, *et al.*, 2011). However, this coating reduces permeability and therefore hinders the process of water transfer (Tarhan, 2007).
In hot air oven drying method, the different fruits such as Apple, Grape, Mango, Orange, Sapota were dried, among that the drying time for Grapes again high that is 6 (144 hrs) days followed by Orange in 5 days (120 hrs) and remaining fruits such as Apple, Mango, Sapota were dried in 4 days (96 hrs) (Table 1 & Fig. 1). Similar to solar drying in this method also Grapes took high time due to its thickness of seed coat.

Table 1: Solar and hot air oven drying duration of five fruits.

Sr. No.	Samples	Solar Drying time	Hot air oven drying time
1.	Apple	5 days(120hrs)	4 days (96hrs)
2.	Grapes	10 days(240hrs)	6 days (144hrs)
3.	Mango	5 days(120hrs)	4 days (96hrs)
4.	Orange	5 days(120hrs)	5 days (120hrs)
5.	Sapota	5 days(120hrs)	4 days (96hrs)



Dried fruits of solar dryer — Dried fruits of Hot air oven

Fig. 1. Different dried fruits of solar dryer and Hot air oven methods.

Biochemical analysis of Fruit powders:
Proximate analysis of solar dried and hot air oven fruits powders: Among all the attributes solar dried Sapota fruit powder having highest content of Protein (0.92%), Fat (1.1%), Carbohydrates (25%) and Calcium (15.3mg/L). However, ash content was observed highest in Apple (2.53%) and moisture content in Mango (5.48%) compare to other fruit powders. In Hot air oven dried fruit powders, Sapota fruit powder having highest content of protein (0.89%), fat (1.3%), carbohydrates (31%) and calcium (14.9%). However, ash content was observed highest in Apple (2.46%) and moisture content in Mango (6.2%) compare to other fruit powders (Table 2 and Fig. 2).

Table 2: Nutrient analysis of all dried fruits powders.

Proximate analysis of solar dried fruits powders						
Sr. No.	**Parameters**	**Apple**	**Grapes**	**Mango**	**Orange**	**Sapota**
1.	Moisture (%)	2.98	4.46	5.48	4.92	2.38
2.	Protein (%)	0.53	0.71	0.82	0.70	0.92
3.	Fat (%)	0.68	0.4	0.46	0.2	1.1
4.	Ash (%)	2.53	1.6	2.0	2.2	0.8
5.	Carbohydrates (%)	15	18	18.9	13	25
6.	Calcium (mg/g)	9	14.95	11	13.6	15.3
Proximate analysis of Hot air oven dried fruits powders						
1.	Moisture (%)	3.51	6.83	6.2	5.1	2.42
2.	Protein (%)	0.44	0.63	0.67	0.68	0.89
3.	Fat(%)	0.84	0.5	0.7	0.8	1.3
4.	Ash(%)	2.46	1.4	1.84	2.1	1.0
5.	Carbohydrates (%)	19	20.5	21.25	15	31
6.	Calcium (mg/g)	8.6	13.4	9.68	12.9	14.9

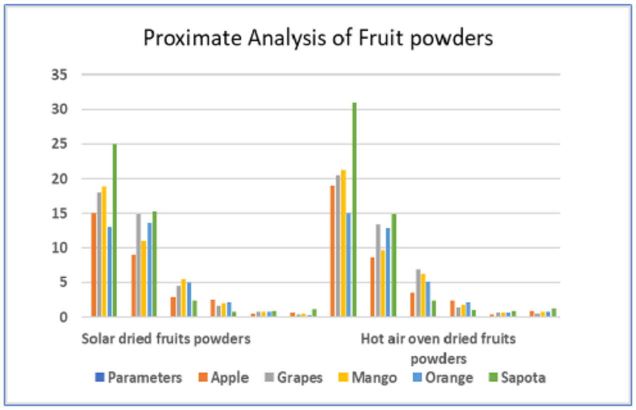


Fig. 2. Nutrient composition of solar and hot air oven dried fruit powders.

Microbial analysis of solar and hot air oven dried fruit powders: In microbial analysis of solar dried fruit powders, apple having highest bacterial (4.5 × 10 cfu/ml) and fungal (2.5 × 10 cfu/ml) count followed by Mango, Sapota and lowest bacterial count was observed in Grapes and lowest fungal count observed in both grapes and sapota. Apple may have maximum number of nutrient and carbohydrates sources leads for the high bacterial load. In Hot air oven dried fruit powders, apple having highest bacterial (9.5 × 10^2cfu/ml) and fungal (5.5 × 10cfu/ml) count followed by Mango, Sapota and lowest bacterial count was observed in Grape's fruit powders (Table 3). Lowest fungal count was observed in Grapes and Sapota fruit powders. Same as like solar method the highest bacterial load found in apple due to its high nutrient's availability.

Table 3: Total bacterial and fungal count of both solar and hot air oven dried fruit powders.

Sr. No.	Samples	Solar dried fruit powders (cfu/g)		Hot air oven dried fruit powders (cfu/g)	
		Bacterial count	Fungal count	Bacterial count	Fungal count
1.	Apple	4.5 × 10	2.5 × 10	9.5 × 10^2	5.5 × 10
2.	Grapes	1.5 × 10	1 × 10	4.5 × 10^2	3.1 × 10
3.	Mango	3.9 × 10	1.5 × 10	7.9 × 10^2	6.5 × 10
4.	Orange	2.1 × 10	1.2 × 10	6.1 × 10^2	5.2 × 10
5.	Sapota	2.8 × 10	1 × 10	6.8 × 10^2	5.1 × 10

Sensory evaluation of individual fruit powders: In all the solar dried fruit powders the overall acceptability i.e colour, taste, appearance, flavour of Apple was high, followed by Mango, Sapota and the lowest acceptability was observed in Orange compared to other fruit powders. In hot air oven fruit powders, the overall acceptability i.e. colour, taste, appearance, flavor was high in Apple, followed by Mango, Sapota and low acceptibity was observed in Orange (Table 4). Overall Hot air oven dried powders were good compared with solar dried powders and these were dried at stable temperature led the less loss of original properties in all fruit powders.

Table 4: Sensory evaluation of individual fruit powders.

Sr. No.	Samples	Colour	Taste	Appearance	Flavour	Overall acceptability
Sensory evaluation of solar dried fruit powders						
1.	Apple	7	8	7	7	8
2.	Grapes	6	5	6	6	6
3.	Mango	7	7	7	7	7
4.	Orange	6	5	5	6	5
5.	Sapota	7	6	6	7	7
Sensory evaluation of hot air oven dried fruit powders						
6.	Apple	8	9	7	7	8
7.	Grapes	7	7	6	6	6
8.	Mango	7	7	6	7	7
9.	Orange	6	6	6	6	5
10.	Sapota	7	7	7	6	7

Sensory evaluation of solar and Hot air oven fruit powder formulations:

Formulation of solar dried fruit powder mix: Based on the individual fruit powder sensory evaluation of solar dried fruit powders, five formulations were made for further preparation of fruit powder mix and the following were formation were made (Fig. 3).

Formulation-1: The ratios of formulation one is Apple was 50%, Grapes (5%), Mango (5%), Orange (5%), Sapota (5%) and Sugar (30%).

Formulation- 2: The ratios for formulation two are Apple (50%), Grapes (10%), Mango (10%), Orange (-), Sapota (-), and Sugar (30%).

Formulation- 3: The ratios for formulation two are Apple (50%), Grapes (-), Mango (-), Orange (10%), Sapota (10%), and Sugar (30%).

Formulation- 4: The ratios for formulation two are Apple (50%), Grapes (1%) Mango (9%), Orange (1%), Sapota (9%), and Sugar (30%).

Formulation- 5: The ratios for formulation two are Apple (50%), Grapes (2.5%), Mango (7.5%), Orange (2.5%), Sapota (7.5%), and Sugar (30%).

Fig. 3. Formulations of solar dried fruit powders drink mix.

Formulation of hot air oven dried fruit powder mix: Based on the individual fruit powder sensory evaluation of hot air oven dried fruit powders, five formulations were made for further preparation of fruit powder mix and the following were formation were made (Fig.4).

Formulation-1: The ratios of formulation one is Apple was (40%), Grapes (7.5%), Mango (7.5%), Orange (7.5%), Sapota (7.5%) and Sugar (30%).

Formulation-2: The ratios for formulation two are Apple (40%), Grapes (1%), Mango (14%), Orange (1%), Sapota (14%), and Sugar (30%)

Formulation-3: The ratios for formulation two are Apple (40%), Grapes (15%), Mango (15%), Orange (-), Sapota (-), and Sugar (30%)

Formulation-4: The ratios for formulation two are Apple (40%), Grapes (-), Mango (-), Orange (15%), Sapota (15%), and Sugar (30%).

Formulation-5: The ratios for formulation two are Apple (40%), Mango (5%), Grapes (12.5%) Orange (5%), Sapota (7.5%), and Sugar (30%).

After formulation with all fruit powders from solar dried powders and hot air oven, further it was carried for sensory evaluation.

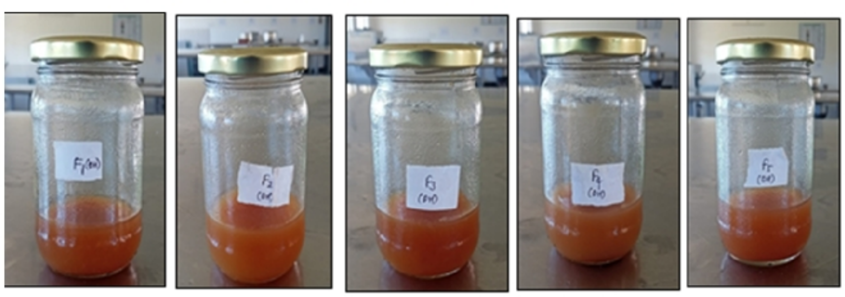


Fig. 4. Formulations of Hot air oven dried fruit powders drink mix.

Sensory evaluation of the solar and hot air oven dried fruit powder formulations: Among all the five formulations the colour, taste, appearance, flavour and overall acceptability was for F4 formulation in solar dried formulations. In Hot air oven dried five powder formulations the colour, taste, appearance, flavours and overall acceptability was high for F5 (Table 5). This was carried for further process. Basavaraj *et al.*, (2008) studied the dehydration of fig fruit by sun drying. This is a concern about safety of the end product. This can be overcome by hot air drying. Drying rate and moisture ratio of fig fruit by thin layer hot air-drying method were determined by drying at air temperature of 55°C, 65°C, 75°C with dry air velocities of 1 and 1.5 m/s. Data on sample mass, temperature and velocity of the dry air were recorded during each test and the rate of dehydration and quality were assessed. Falling dehydration rate period was observed where drying air temperature has the greatest effect on the drying rates and air velocity had the least effect.

Table 5: Sensory evaluation of fruit powders formulations of solar and hot air oven methods.

Sensory evaluation of hot air oven dried fruit powder formulations						
Sr. No.	**Parameters**	**F1**	**F2**	**F3**	**F4**	**F5**
1.	Colour	7	7	7	8	6
2.	Taste	6	6	6	7	6
3.	Appearence	7	6	6	7	7
4.	Flavour	6	6	6	6	6
5.	Overall acceptability	7	6	7	7	6
Sensory evaluation of hot air oven dried fruit powder formulations						
1.	Colour	7	7	7	7	8
2.	Taste	7	8	7	6	8
3.	Appearance	7	7	7	7	7
4.	Flavour	7	7	7	6	8
5.	Overall acceptability	7	7	7	7	8

Isolation and purification of *Lactobacillus casei shirota* on two mediums from Yakult probiotic milk. Isolated *the Lactobacillus Casei* shirota from Yakult Probiotic milk and recorded the colony morphology of all the colonies which was grown in MRS and NA medium plates. The common colonies were taken for further purification and purified colonies were used for further multiplication in milk.

Growing of *Lactobacillus casei* in milk for addition to the final fruit powder mix and checking of viable cell count in milk:

Purified *Lactobacillus casei shirota* was multiplied in 100 ml of milk at 37°C in shaking cum rotary incubator up to 24 hrs. After 6 hrs of inoculation in milk every hr from 7 to 12 hrs we have done plating in selected medium and kept all the plates for incubation at 37°C up to 24 hrs. After incubation done the cfu/ml counting for each plate and we found that 10^7 in 12 hrs of inoculated plates. Then 12 hr of inoculated milk was chosen for further process.

Centrifugation of Lactobacillus culture for final addition to fruit powder mix and Preparation of fruit powder formulations with probiotics: The 10^7 cell count was taken for addition into final formulated fruit powder mix. Before the addition of the cells were centrifuged at 2000 RPM for 10 minutes. After centrifugation cell pellet was transferred to other tubes and the left-over supernatant was drained. Further cell pellet of 50 ml milk was taken for addition into the powders. Lactobacillus spp. pellet was again diluted in 1 ml of sterilized water. This diluted cell was added to the final 50 grams best formulation and mixed well in laminar air flow. This mixer was air dried for 8 hrs in aseptic condition for final pack. Multiplication of lactobacillus, centrifugation and preparation of final formulation process were carried for maintaining the 10^7 cells in end formulated product.

Proximate analysis and sensory evaluation of formulated probiotic instant mixed fruit powder: The proximate values of final formulated sample have the moisture, protein, fat, ash, carbohydrates and calcium values are 7.38%, 0.76%, 1.022%, 0.4%, 15.04% and 14.00% respectively.

The sensory evaluation of the probiotic fruit powder mix was mentioned in above table. The taste and flavour of the probiotic fruit powder mix was reduced when compare to final formulated fruit powder mix. The colour, flavour and overall acceptability were remaining same.

CONCLUSION

The present work demonstrates for the first time for preparation of instant probiotic mixed fruit powder. Five (5) fruits dried through solar drying and hot air oven, the drying time for Grapes were high in both the methods compared with remaining fruits. Sensory evaluation of all individual fruit powders, Overall Hot air oven dried powders were good compared with solar dried powders and these were dried at stable temperature that led the less loss of original properties in all fruit powders.

Isolated the *Lactobacillus casei* shirota from Yakult Probiotic milk and the 10^7 cell count was taken for addition into final formulated fruit powder mix. The proximate values of final formulated Probiotic fruit powder mix sample have remained same. Final it was proven that Probiotic bacteria does not influence the probiotic fruit drink mix in sensory evaluation of final product. The colour, flavour and overall acceptability were remaining same. Finally packed in sachet of probiotic instant fruit powders mix. This work may give innovative product which will standard one for further preparation of fruit-based products.

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Conflict of Interest. The authors declare that there is no conflict of interests regarding the publication of this paper.

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