Preparation and analysis of blended jelly with flavor of Mango and Alovera Juice

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Abstract- *The study aimed to develop a blended jelly product using mango and alovera and its major component. Aloe vera is known for its medicinal properties and nutritional values benefits health and significant amount and mango is known for its taste and loved by all age group people. Our purpose was to develop such products which have high nutritional values with their favorable taste for all age group peoples.*

For this, Physical and chemical constituents of alovera and mango sample were tested in raw form as well as in jelly form. These properties were compared and it was observed that the product have elevated quantity of nutritional components like protein, phenolic content and antioxidant property. The shelf life of the product was evaluated and observed a storage period of 15-20 days, in which the product did not lose its natural consistency and other chemical properties. Microbiological analysis of the product included TPC, TCC and yeast and mould count. All the counts were observed to be normal range thus providing the suitable for consumption.

Keywords- Physical, Chemical and Microbiological activity, Mango and Aloe Vera, Juice extract, Zone of inhibition.

I. INTRODUCTION

Aloe Vera belonging to the family *Liliaceae* is commonly known as "aloe gel." It is locally called "kattalai" which is found all over India. Chemical constituents in this plant are aloin, isobarbaloin, and emodin [1]. The aloe vera has many common names and often referred to as burn plant, first aid plant or medicine plant. Its name is most likely derived from the Arabic word "Alloeh" meaning shining bitter substance [2].
Aloe Vera is a spiky cactus like xerophytes. It is a clump forming perennial plant with thick fibrous root which produces large basal leaves, usually 12–16 per plant, weighing up to 1.5 kg when mature [3]Today, the aloe Vera industry is flourishing and the gel is used in many products such as fresh gel, juice and other formulations for health, medicinal and cosmetic purposes[4]. Most aloe vera plants are non toxic but a few are extremely poisonous containing a hemlock like substance [5]. *Aloe variegate* is a dwarf species which is only a few centimeter in diameter and is a popular in home plant. A recent market analysis report indicates that in 2008 Americans have spental most 40 billion dollars on functional foods, drinks and supplements for the improvement of their appearance as well as to provide energy and added nutrition to handle health issues such as hypercholesterolemia and diabetes. During the past few years, scientists have discovered yet another remarkable array of substances .Today the whole leaf approach is adding new dimensions to the properties of this remarkable plant [4].

Mango *(Mangifera Indica)* is known as an appreciable fruit due to its pleasant aroma and flavor, whose nutritional value presents high calories and vitamin contents, among others. This fruit is an emerging tropical export crop produced in about 90 countries in the world with a production of over 25.1 millionns tons**.** The mango world market earns about 700 million dollars per year, and world production in 2007 and 2008 was superior to 30 x 106 tones whose world export was approximately 11 million tons (FAO, 1997-2009[6]. Mango is considered as a good source of dietary compounds, such as ascorbic acid, phenolic compounds and carotenoids [7,8,9], which are beneficial to health due to their antioxidant capacity[10,11].The pulp of mango is effective for leukemia, prostate, breast and colon cancers *in vitro*. Peels are the major by-products of different fruits and are good sources of photochemical and bioactive compounds [12,13]. Mango peel has been found to be a good source of polyphelones, carotenoids, dietary fiber, vitamin E and vitamin C[14,15] and it showed significant antioxidant properties[16,17].

The purpose of our study was to make a nutritional product with the combination of Mango and Alovera which gives favorable taste and high nutritional values for all age groups persons because both mango and alovera are known for their health benefit and their medicinal benefit also. In this study we analysis the product by chemical and microbiological testing and observed that this product is significant for consumption.

II. METHODOLOGY

In this study we prepared a jelly product by using Aloe Vera and Mango which developed a good nutritional values and flavors. For this production we performed Physical and

Chemical methods to test the sample in raw form as well as in jelly form and performed microbiological method to Product included TCC and TCP which determined the coli form count and total plate count of microbes in the sample and product.

Soil sample was collected from the nearby playground and the inoculation was done by spread plate technique on the agar plate after incubation time the colonies were obtained then performed streaking to obtained single colony of bacteria from spreading plate. For identification of shape and morphology of bacteria, gram staining was performed.

II.I Different biochemical test for the isolated bacteria from soil sample

The isolated colonies were further performed to the identification of bacteria from soil samples by using different biochemical test which were Indole, Glucose fermentation, Citrate, Catalase and MR-VP test. These biochemical tests are determined different biochemical activities of different bacterial species.

II.II Procedure to Prepared Jelly of Alovera and Mango

A. Selection of Raw materials

Fleshy green *Aloe Vera* leaves were collected from a local garden in Lucknow. And the ripe mango was collected from a local fruit market in Lucknow City

B. Alovera juice extraction

The juice of Aloe Vera was extracted by cold extraction method. This method helps in the stabilization of juice. Firstly the leaves were cleaned under running tap water to remove dirt particles and then alovera leaves were dipped in500ppm of KMS for 10 minutes and then washed. Leaves were cooled to5ºC for stabilization after the cooling the leaves were vertically cut and the gel was separated. The separated gel was allowed to resolve for 12 hours then homogenized using mixer grinder, filtered, pasteurized and store.

C . Mango juice extraction

The peel of the mango was removed using a sharp knife, was cut into small chunks followed by blending. The juice was then filtered using muslin cloth, pasteurized and stored.

D. Blend Preparation

0.5% low calories sweetener was added to mango and alovera juice. If a juice is salt, pinch of black salt was added to the juice to decrease the tartness. The blends were pasteurized at 97ºC for 2-3 min, cooled and stored at a refrigerated temperature.

E. Procedure for jelly preparation

Take the alovera and juice sample and boiled it for 5 min. Add 18.15 gm of sugar and continuously stirred cooked the sample for 15 min until reaching the jelly temperature (212F) after the cooking add 0.27gm of citric acid and stirred continuously. The mixture was heated again for 30 min at 80 until reach desirable continuously. The sample was prepared, poured in jar and stored at 48 hrs at room temperature to allow getup.

II.III Identification of chemical activities of Alovera and Mango juice

A. Titrable acidity: The sample was added with 0.3 ml indicator solution (phenopthanein solution) and titrated with 0.1 N NAOH. Calculate the amount % acid as per ml of liquid food as per gram of solid food using formula:

% acid = No. of NAOH X Conversion factor

The conversion factor is necessary to know that what is the major acid present in a food before selecting.

B. Vitamin C: Add aliquot 10 ml of the sample in distilled water and add starch indicator solution. Titrate the sample with iodine solution the end point of the titration is identified as the first permanent trace of dark blue – black color due to the starch iodine complex.

*C. Total Phenol Content***:** This procedure was done by Folin-Ciocalteu reagent add this reagent and mix to the different blend taken in separated test tube and incubate for 15 minutes in dark at room temperature. After dark incubation 2.5 ml of 7% $Na2CO_3$ as added to test tube and again incubate for 30 min. The observation was measures at 760nm. A standard curve was plotted using Gallic acid concentration.

D. Sugar estimation: In this test Anthrone reagent used which forms green colour complex which can be measured by 620nm or by using a red filter. A standard curve was plotted of glucose concentration (10-100mg).

E. Antioxidant activity: The antioxidant was determined by using a colour complex perssuian blue. In this test phosphate buffer,1% potassium ferric cyanide mixed and incubate at 50ºC After cooling mix 2.5 ml of 10% tri caloric acid and 0.5 ml of 0.1% of ferric chloride. The amount of ferric cyanide complex was determined by measuring the formation of perssuian blue complex at 700nm.

F. Determination of protein: In our study protein of the sample was determined by Lowery method. Reading was determined by using Calorimeter at 660nm. A standard graph was plotted and calculates the protein in the sample.

II.IV Microbiologically Analysis of the sample and Product

In our study the microbiological activity of microbes in the sample was determined by three methods Total coli form counts[TCC] , Total Fungal Count and Total Plate Count [TPC]which also known as Aerobic Plate Count.

A. Total Coli form count: The total coli form count was determined by (Richardson, 1985).Spread the sample (alovera

&mango, product) on Mac conkey agar media plate and incubate for 24 hours and the no. of the coli forms count in Cfu/ml

B .Total Fungal Count: Total fungal count was two approaches which were typically use to determined mould contamination with respect to fungal spore identification and enviromentation. The sample and product was spread on the Nutrient agar media and incubate for 24 hours. The number of yeast and molds were count in Cfu/ml.

C. Aerobic Plate Count or Total Plate count: It indicate the level of microorganism in a product to determined the APC of food which developed by the association of analogical chemicals .The plate count of juice must not exceed$10^{-3.}$

D. Antibacterial activity: The antimicrobial activity of sample was done by agar well diffusion method. The antibacterial test of mango, alovera and product was done against *Aeromonas spp*. and the zone of inhibition was measured.

III. RESULT AND DISCUSSION

The result of biochemical test of isolated bacteria from soil sample was to be found *Aeromonas* spp. The result was summarized on below table no.1.

S.No	Biochemical Test		Result
1	Indole test		Positive
2	Sugar Fermentation Test	Glucose	Positive
		Maltose	Positive
		Lactose	Negative
3	MR test		Positive
4	VP test		Negative
5	Catalase test		Positive
6	Citrate test		Positive

II. V Qualities Parameter Test for raw sample and Jelly Product

A. Titrable acidity

In alovera, Mango and Product Titrable acidity was determined as 0.01%, 0.02% and 0.05% respectively. A study done by **Mod. Anwar Hossain et.al** [18] he obtained the TA (Titrable acidity) of the mango sample The product decreased slightly 1.06 to 1.02 (%) and 0.92(%) at −10°C and 4°C, respectively, after 12 days .Thus these results revealed that time and temperature are responsible for physicochemical changes of fruits and the major changes occur when fruits are stored for long time at high temperature storage.

B. Sodium Chloride

In alovera, Mango and Product sodium chloride was determined as 0.03%, 0.02% and 0.03% respectively.

C. Vitamin C

In our study Alovera, Mango and Product sodium vitamin was determined as 0.01%, 0.15% and 0.171% respectively. Other study by **Mohd. Anwar Husain et., al**[18] he determined vitamin C content in mango increased slightly from 24.1 to 26.4 mg/100 g fresh weight but at 4°C it decreased slightly to21.6 mg/100 g fresh weight. He clearly indicated that vitamin C content decreased with increasing days of storage during the ripening. Another study was done by **Kondapali Naresh et.al** [19] he observed a significant ($P < 0.05$) reduction in ascorbic acid in all the irradiated mango samples with increase in radiation dose

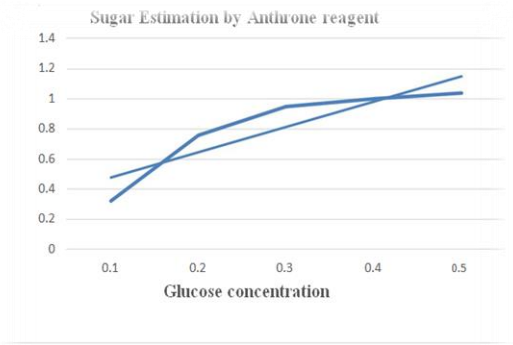
TableII: Shows the acidity, sodium and Vitamin of the Alovera, Mango and Product

S.NO.	Acidity%gm/lit.	Sodium % gm /lit	Vitamin% gm/lit
1	**Alovera**		
	0.01%	0.03%	0.01%
2	**Mango**		
	0.02%	0.02%	0.15%
3.	**Product**		
	0.05%	0.03%	0.171%

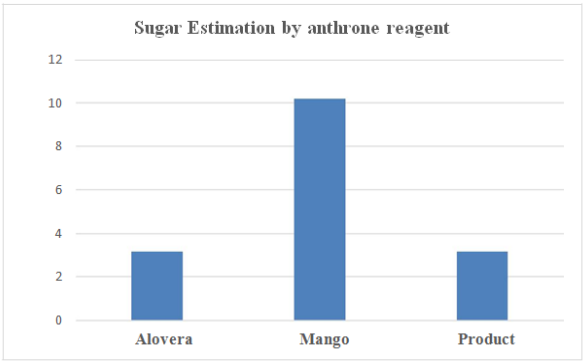
D. Sugar Estimation

Sugar estimation was done by an throne reagent in alovera, Mango and Product sugar content was calculated as 83.36mg/ml, 83.47mg/ml and 90.47mg/ml respectively. It showed that sugar content of sample and product decreased significantly and increased during storage period. A study **Beatrice Mgaya *et. al***[20] on blended Roselle fruit juice he observed their reducing sugar value for Roselle-fruit ranged from 2.95 to 9.92 mg/100 g. The sugar content of fruit juices usually increases with increased storage period.

According to **Mod. Anwar Husain *et.al***[18] determined their sugar content of mango fruit by using anthrone reagent he observed that the reducing sugar content of mango fruit was slightly decreased and after the storage of 12 days the starch content of mango increased(< 0.01) from 12% to 4.3% .



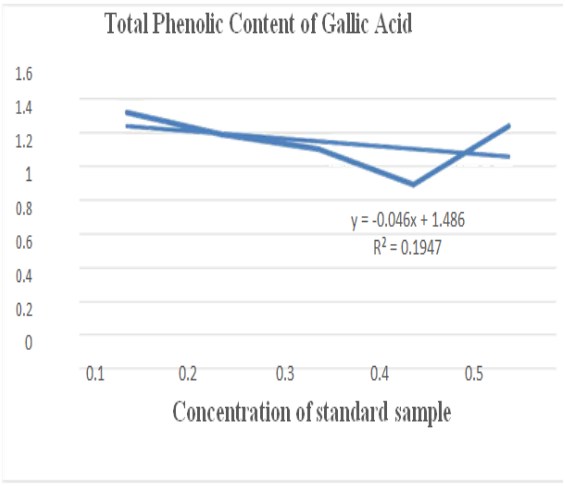
Graph no. 1 sugar estimation of standard glucose by Anthrone reagent



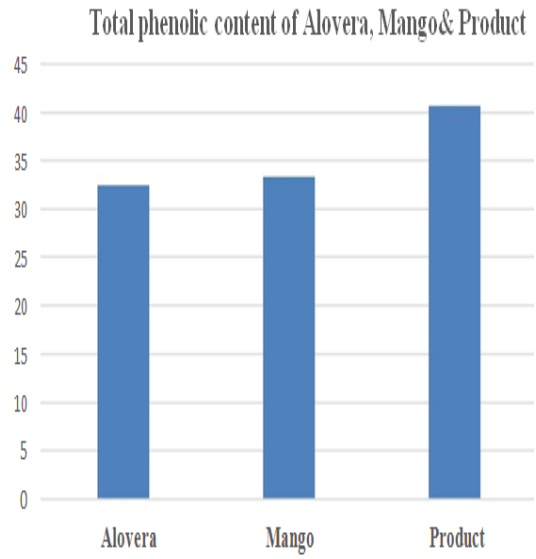
Graph 2: Calibration of sugar estimation by an throne reagent

E. Total Phenolic Content

Total phenol content in alovera, Mango and Product was increased as 32.4 mg/ml, 33.30 mg/ml and 40.65 mg/ml respectively. A study done by **Beatrice Mgaya et.al** [20]on determination of Total phenolic content on fruit sample he observed during storage 9.71, 22.3, 21.2 mg/100 during of storage time.



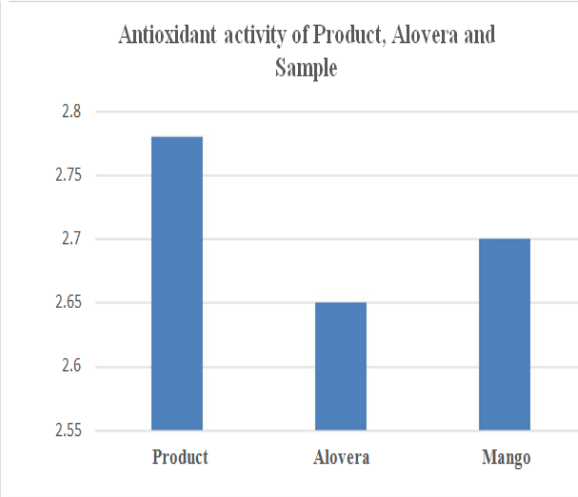
Graph 3: standard graph of total phenolic content



***Graph no** 4.Calibration of total phenolic content*

F. Antioxidant Activity

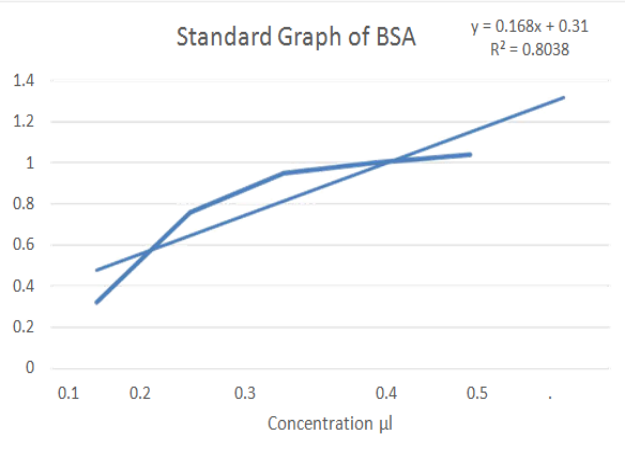
The antioxidant of the sample and product was determined by ferric reducing ability of plasma (FRAP).The Mango showed lowest antioxidant activity followed by product. Anti oxidant activity showed the highest content of phenol. A study done by **Beatrice Mgaya et.al** [20] on blended Roselle fruit juice he observed antioxidant activity by FRAP assay and their results showed that antioxidant activity levels did not decrease substantially.



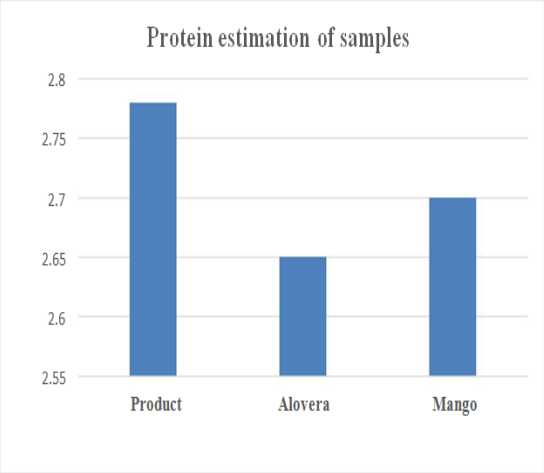
Graph no.5 Antioxidant activity of Alovera, Product and Sample

G. Protein Analysis

In our study Protein analysis of the sample is determined by Lowery method. The alovera showed the lowest protein quantity followed by product and mango.



Graph no.6 Standard graph of Lowry's method of BSA



Graph no. 7 Protein estimation of sample.

III.II Result of Antibacterial activity test of Sample and Product

The antibacterial activity test of mango, Alovera and product was done by agar wall method against the *Aeuromonas spp*. And the zone was measured which resulted for alovera and product zone of inhibition was nil, in mango zone of inhibition was 10mm measured.

A study done by **K R Cheruiyot** [21]on antibacterial activityof ethanol plant extract against *Pseudomonas aeruginosa* and zone of Inhibition of was measured 17 mm . The zones of inhibition produced by the test organisms indicated their susceptibility to the plant extract. Another study done by **Geethashri Anand** [22] on diffusion technique to evaluate the antimicrobial properties of mango and cashew plant extracts. The Zone of inhibition by mango and cashew extract against *Staphylococcus aureus*, indicate susceptibility to the plant extracts.

Table III: Result of Microbiological analysis of Sample and Product

Treatment	Aerobic plate Count (Cfu/ml)	Total fungal count (Cfu/ml)	Total plate Count (Cfu/ml)	Coli form count (Cfu/ml)
Alovera	7.08×10^{-3}	Nil	6.9×10^{-4}	2.2×10^{-3}
Mango	2.3×10^{-3}	3.2×10^{-3}	4.32×10^{-3}	2.14×10^{-2}
Product	12.3×10^{-3}	2.0×10^{-3}	8.52×10^{-3}	6.5×10^{-3}

Table IV: pH of sample and Product

The pH of the blended alovera and mango jelly and the product showed that alovera gives high acidity compare to mango and product. The table of P^H summarized below:

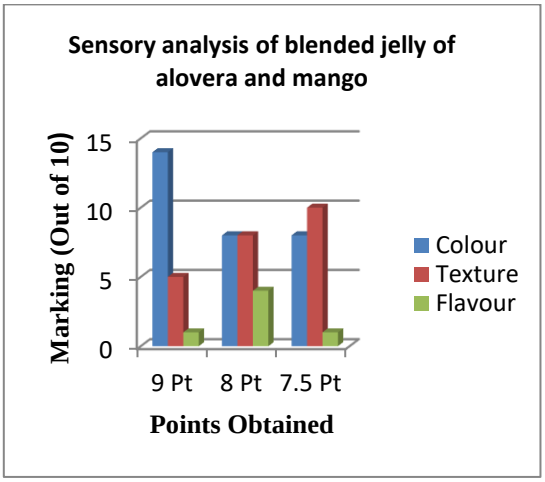
pH	Alovera	Mango	Product
	6.69	4.46	5.31

IV. SENSORY ANALYSIS

Sensory characteristics of any food item contribute significantly to its consumer acceptance or rejection. In our study the product sample was evaluated using hedonic method for sensory characteristics and overall acceptability by a panel of 20 judges including faculty members, master students of our departments. Panel lists instructed to evaluate each attribute by giving points .Four different parameters were used to grade the overall quality in terms of colour, flavor, texture and overall acceptance. The flavored of alovera and mango jelly were served to our Panel list at morning between 10 to 11 Am. The mean intensity scores of all attributes were calculated and plotted.

A study done by**Varakumar et al. 2012**[23] On sensory evaluation of mango juice with their selected panel lists. Their scales were balanced, once they present equal number of positive and negative categories(1–9).He observed that the scale of their sensory analysis was balanced .The mango juice is accepted by their panel lists

The Sensory analysis points of our study were given by Panel list between (1-9).The point 9 shows like very much, 8 like moderately and 7 slightly like. Panelists found that the overall sensory scores of alovera and mango jelly were signifitically acceptance of consumers and it was liked by all age groups people.



Graph 8: **Marking of alovera and mango jelly**

V. CONCLUSION

The present study revealed that the formulation of mixed blend jelly is possible to satisfy consumer taste with importing health benefit . The content of vitamin C,phenolic content, reducing sugars was observed in the balanced scale The treatment the mango jelly blend with Aloe Vera was found to be effective jelly with and it can be stored for 15-20 days.

The blend had good sensory characteristic and can be accepted in the market as a healthy jelly. On the bases of the result of conducted experiment, it was concluded that the storage life of the jelly could be increased by increasing the alovera content. Sensory quality was also good till end of the storage.

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