



An evaluation of physio-chemical properties on aloevera gel fortified yoghurt

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Received: 08-04-2017

Accepted: 05-09-2017

DOI: 10.18805/ajdfr.DR-1244

ABSTRACT

The present study was conducted to evaluate the effect of physicochemical and phytonutrients qualities of aloevera gel fortified yoghurt. Three different concentration of yoghurt were developed with 10, 15 and 20 percent of aloevera gel addition. Based on sensory evaluation, the sample AY2 has scored higher in the overall acceptance among the samples. On the other hand, the pH and titratable acidity were found to be inversely proportional to the concentration of aloevera gel addition in yoghurt. In the results of fat content that all the experimental samples were shown gradual decreasing effect when compared with the control sample. As per the result of protein, Vitamin C and minerals of experimental samples have found constant effect when compared to control sample. The content of fiber was absent in control whereas in the aloevera gel concentrated samples AY1, AY2 and AY3 contains 0.19, 0.23 and 0.26 respectively. On the qualities of phytonutrients of steroids, saponins, phlobatannin and anthroquinone were found in all the samples except control.

Key words: Aloevera gel, Physicochemical, Phytonutrients qualities and Yoghurt.

INTRODUCTION

Yoghurt is a famous fermented milk product with a variety of textures (e.g. liquid, set and smooth), fat contents (e.g. luxury, low-liquid, fat free) and flavours (e.g. natural, fruit, cereal), can be consumed as a snack or part of a meal, as a sweet or savoury food, and available all year around (McKinley 2005). Yoghurt is more nutritive than milk in relation to vitamins and minerals bioavailability, lactose intolerance and protein digestibility. It is also used as a source of calcium and phosphorous (Mohamed *et al.*, 2014). Among functional foods, dairy based functional foods accounts for nearly 43 % of the market, which is almost entirely made up of fermented dairy products. The functionality and marketability of yoghurt can be increased by adding fruit concentrates such as apple, strawberry and other fruit yoghurts are already available in market (Devbrat *et al* 2016). Instead of adding these fruits, aloevera gel can be incorporated to increase the functionality of yoghurt.

Aloevera leave contains 95 percentage of water, 75 percentages nutrients, 200 active compounds, 20 minerals, 18 amino acids, 12 vitamins and 92 enzymes. It can be used as the source of vitamins like A, B₁, B₂, B₆, B₁₂, C, E, Folic acid, Niacin etc. owing to its succulent properties, it is a rich source of nutrients and essential minerals. There is growing experimental evidence for its use as an antiviral, antimicrobial activity an ulcer remedy and an adjuvant cancer treatment due to its immune modulating effects. Due to its high nutritional value it can be incorporated as base food products like aloe juice, aloe squash, to get nutritional food to human health.

Considering the above facts, an attempt has been made to prepare yoghurt using aloevera gel with good sensory properties. The main objective of this work was to optimize the acceptance level of aloevera gel and to evaluate the physicochemical and phytonutrients qualities of developed yoghurt.

MATERIALS AND METHODS

The present study was carried out in the Dairy Technology Laboratory of Faculty of Agriculture and Animal Husbandry, Gandhigram Rural Institute - Deemed University, Gandhigram, Dindigul District, Tamilnadu, India.

Materials: Toned milk (Raaj brand), skimmed milk powder (Sagar brand) and cane sugar was purchased from the local departmental store at Chinnalapatti Town, Dindigul district, Tamilnadu. Microbial yoghurt starter culture was purchased from Department of Livestock Products Technology, Veterinary College and Research Institute, Namakkal.

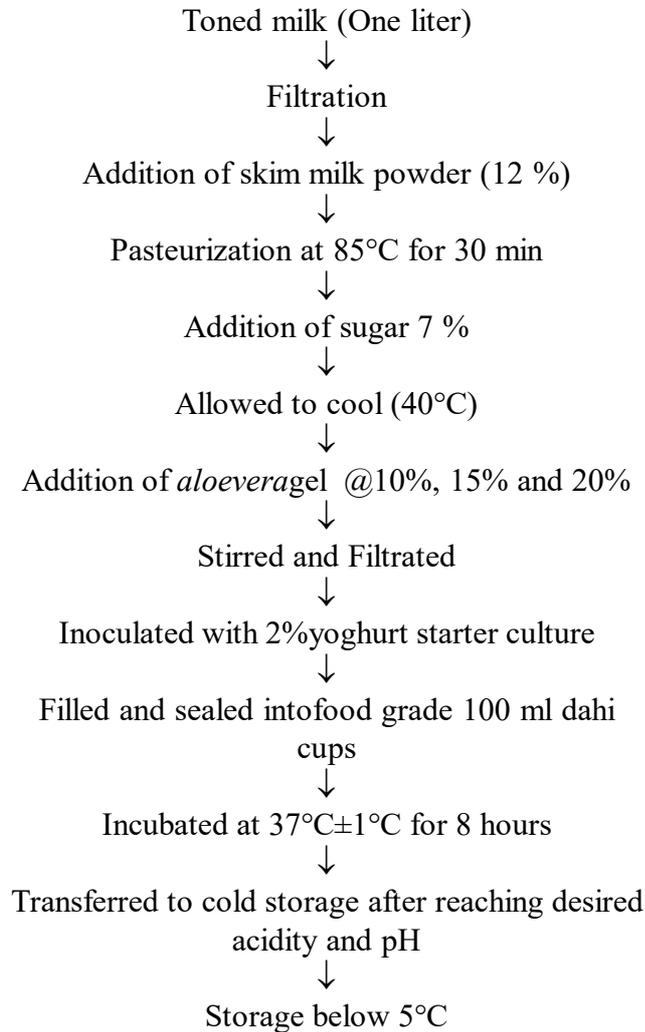
Preparation of aloevera gel: The fresh aloevera plant leaves was selected to derive gel. An outer layer of aloevera leaves was peeled off and inside white flesh i.e., gel was collected and cleaned with portable water. Then cleaned gel was used for product development.

Methods

Product description: The aloevera fortified yoghurt was prepared by using toned milk (one liter), 12% skim milk powder, sugar (7 %) and aloevera gel. The received toned milk and skim milk was mixed and heated or pasteurized properly at 85°C for 30 minutes and then mixture was cooled

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Flow chart for preparation steps of *loeveragel* added yoghurt:



to 40°C. Inoculation was done using 2% of *streptococcus thermophilus* and *Lactobacillus Bulgaricus* culture. Three different concentration of aloe vera gel was added separately into the yoghurt mix and incubated. Then it kept for incubation at 37°C±1°C for 8 hours. After incubation the samples were kept under refrigerated at 5°C. In the present study, 10, 15 and 20 percentages of three different concentration of aloe vera gel was added in yoghurt all experiments were carried out in triplicates. which was

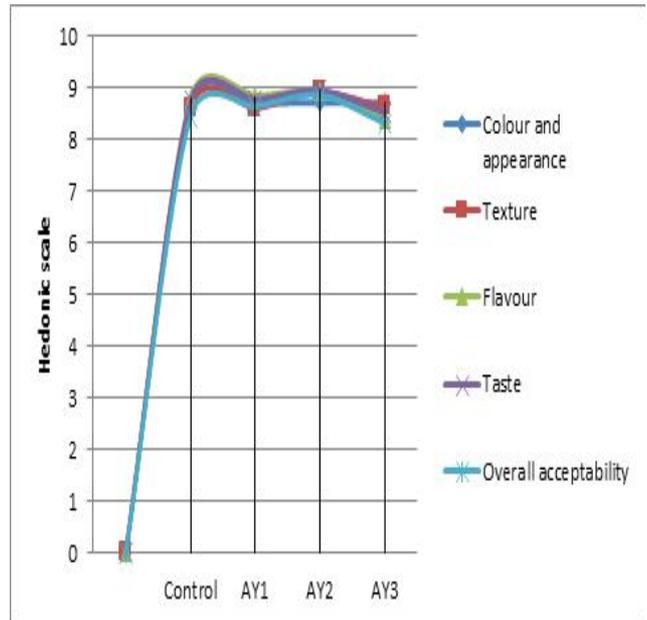


Figure 1: sensory evaluation of different concentration of aloe vera gel added yoghurt

compared with standard control yoghurt (C) and the samples were coded as, AY1,AY2 and AY3 respectively.

Sensory evaluation: The nine point's hedonic rating scale was used to measure the sensory evaluation of developed yoghurt. The control and aloe vera gel added yoghurt samples were served to the semi trained panel, and the members were asked to rate the acceptability of the samples ranging from like extremely to dislike extremely.

Physicochemical analysis: All the samples were analysed for the protein (Pyne's method), fat (Gerber method), fibre (acid alkali wash method) and acidity (Titration method) are determined using the method as described by IS: 1479 (Part II) 1961. The pH was measured using digital pH meter. Syneresis was measured using dilution and centrifuging method. Vitamin C, minerals and phytonutrients were determined by AOAC (2000).

RESULTS AND DISCUSSION

Sensory evaluation of aloe vera gel added yoghurt: The quality attributes viz., colour and appearance, texture, flavour, taste and over all acceptability of developed yoghurt samples were determined. The results depicted in Table 1 show that, AY2 had highest score of 8.9 for colour and appearance

Table 1: Sensory evaluation of different concentration of aloe vera gel yoghurt samples

Parameters*	Sensory evaluation of different concentration of aloe vera gel yoghurt samples				
	Control	AY ₁	AY ₂	AY ₃	CD±0.05
Colour and appearance	8.71	8.70	8.72	8.71	NS
Texture	8.60	8.61	8.92	8.62	0.08
Flavour	8.81	8.85	8.93	8.40	0.15
Taste	8.75	8.77	8.95	8.52	0.11
Overall acceptability	8.44	8.64	8.86	8.32	0.19

*mean values, n=3; CD-critical difference; NS-non significant

Table 2: Physicochemical analysis of different concentration of aloe vera gel yoghurt samples

Parameters	Physicochemical analysis of different concentration of aloe vera gel yoghurt samples					F Value
	Control	AY ₁	AY ₂	AY ₃		
Fat	3.0±0.01	2.7±0.05	2.5±0.02	2.3±0.05		0.26
Protein	2.9±0.14	3.2±0.13	3.4±0.10	3.7±0.15		0.52
Fibre	0.00±0.01	0.19±0.05	0.23±0.05	0.26±0.05		1.25
Ash	0.72±0.05	0.71±0.05	0.72±0.05	0.72±0.05		0.02

followed by AY1, Control, AY3 with the scores of 8.8, 8.7, 8.6 respectively. Regarding texture the sample AY2 has the highest score of 8.9, when compared with other experimental sample. Based on the result of flavor and taste, AY2 sample had highest score next to sample AY1 and control sample. The result of overall acceptability, the sample AY2 had scored the highest 8.8 followed by AY1, Control, AY3 with the scores of 8.6, 8.4 and 8.3 respectively. The results are in accordance with Saarela, *et al* (2002). The results were shown graphically in Fig-1.

Physicochemical evaluation of aloe vera gel added yoghurt: The results furnished in the Table 2 shows the physicochemical composition of experimental samples. The fat percent of control sample was 3.0 percent whereas AY1, AY2 and AY3 lowers the fat level when compared to control sample with 2.7, 2.5 and 2.3 percent respectively. The decrease in fat percentage is may be due to the addition of aloe vera gel. The results are in accordance with Siddharth priyadharshi *et al* (2012). As per the result of protein content, the sample AY3 has 3.7 per cent and AY2, AY1 and control were 3.4, 3.2, and 2.9 per cent respectively. Thomas and Mills (2000) reported that the increasing protein content in yoghurt when compared to milk due to the breakdown of casein into amino acid and peptides by the lactic acid bacteria. In the case of fibre content, all the aloe vera gel

treated samples has proportionately increased with fibre content where as control had nil. Jothylingam and Pugazhenth (2013) also investigated and reported that aloe vera added milk products have fibre enriched as per the addition. The results were shown graphically in Figure 2.

In the Figure 3 shows respective to acidity and pH of experimental samples. The average range of acidity found 0.77 to 0.79 percent and pH was 4.5 to 4.8 for entire samples during the refrigeration storage period of 14 days. The acidity percentage increases gradually during storage period because of lactic acid fermentation and also slight acidity in aloe vera gel. The pH decreases with increase in acidity which is in accordance with Panesar and Shinde (2011).

The common defect of yoghurt i.e, syneresis (wheying off) was examined. Based on the result control sample had the high syneresis percentage with the value of 4.2 percent followed by AY1, AY3 and AY2 with the value of 3.9, 3.7 and 3.6 percent respectively. The decrease in syneresis percent is due to the addition of aloe vera gel which acts as stabilizer. The results are in accordance with Fox *et al* (2000).

Good sensory appeal sample AY2 was compared with control for vitamin C determination. As per the results the control sample was found 1.6 mg, whereas in the sample

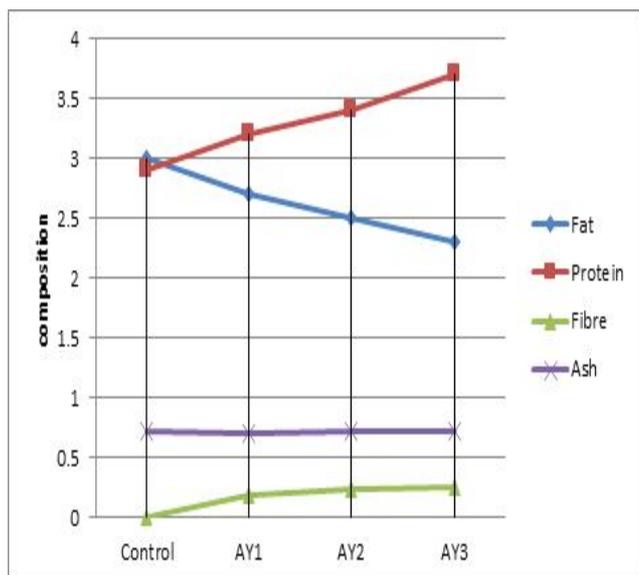


Figure 2: Chemical constituents of different concentration of aloe vera gel added yoghurt

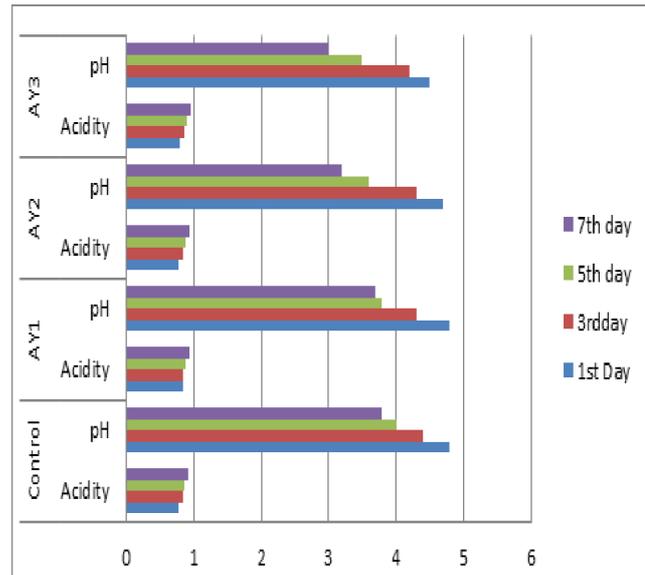
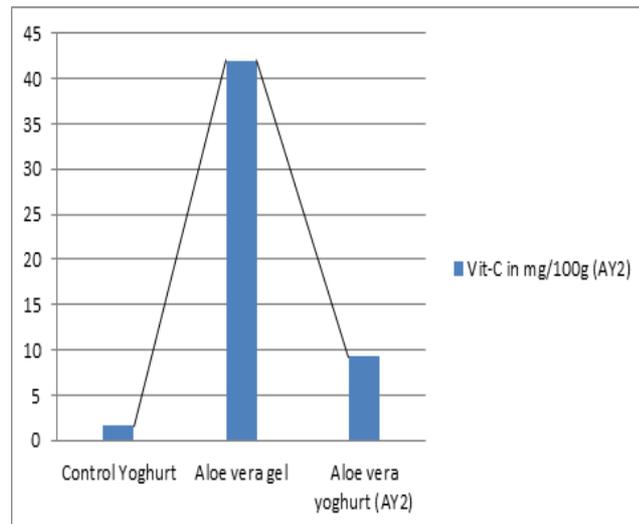


Figure 3: Titratable acidity & pH of different concentration of aloe vera gel added yoghurt

Table 3:Phytonutrients of different concentration of aloe vera gel yoghurt samples

Phytonutrients	Phytonutrients of different concentration of aloe vera gel yoghurt			
	Control	AY1	AY2	AY3
Steroids	-	+	+	+
Flavanoids	-	-	-	-
Alkaloids	-	-	-	-
Saponins	-	+	+	+
Terpenoids	-	-	-	-
Anthroquinone	-	+	+	+

**Figure 4: Vitamin C content comparison between aloe vera gel, control and AY3**

AY2 found 9.25 mg of vitamin c content. The increase in vitamin C content is due to the addition of aloe vera gel. The results were shown graphically in figure 4. Mineral content was determined for the sample AY2, which has the mean value of calcium; phosphorus, potassium and sodium were found 163 mg, 133.1 mg, 220 mg and 64.86 mg per 100g. The results are in accordance with USDA parameters which

REFERENCES

- AOAC (2000) Dairy products. In official Methods of Analysis. Association of Analytical Chemists Inc: Gaithersburg, USA.
- Devbrat yadav, Harish Kumar, Arvind Kumar, Jha Alok, Pramod Kumar and Goyal Arun (2016) Optimization of polyphenolic fortification of grape peel extract in stirred yogurt by response surface methodology. *Indian Journal of Dairy science*, **69** (1) : 41-49.
- Fox PF, Mc Sweeney P, Cogan TM and Guinee TP (2000) *Fundamentals of Cheese Science*. 1st Ed., Springer, New York.
- Indian standard: 1479 (Part II) (1961) Chemical Analysis of Milk. Indian standards Institution, Manak Bhavan, New Delhi.
- Jothylingam and Pugazhenthil T. R. (2013) "Evaluation of dietetic aloe vera enriched flavoured milk for its microbial quality" ; *CIBTech Journal of Microbiology* ; **3** (1) ; pp 24-27.
- McKinley MC (2005) The nutrition and health benefits of yoghurt – a review. *Soc Dairy Technol* 58 (1) : 1- 12.
- Mohamed AG, Zayan AF, and Shahein NM (2014) Physicochemical and sensory evaluation of yoghurt fortified with dietary fibre and phenolic compounds. *Life Sci J* 11 : 816 - 822.
- Panesar PS, Shinde C (2011) "Effect of storage on Syneresis, pH, *Lactobacillus acidophilus* Count, *Bifidobacterium bifidum* Count of Aloe vera fortified probiotic lassi. *Current Research in Dairy Sciences* **4**(1): pp- 17- 23.
- Pankaj, K.,(2013). Therapeutic and medicinal uses of *Aloe vera*: A Review. *Pharmacol. & Pharma.*, **4** : 599-610.
- Saarela M., (2002) Gut bacteria and health foods: The European perspective. *Int. J. Food Microbiol.* **78**, 99-117.
- Siddharth Priyadarshi (2012) Yoghurt preparation, characteristics and recent advancement. *Cibtech Journal of Bio-Protocols*; **1** (2); pp-32-44
- Thomas TD, and Mills OE (2000) Proteolytic enzymes of dairy starter cultures. A review *J. Food Microbiol.* **46** (3) 245-268.

contain 183mg/100g of Ca, 144 mg/100g of P, 234 mg/100g of K and 70 mg/100g of Na respectively.

The phytonutrient quality was determined. The results present in the Table 3 results showed that steroids, anthroquinones, saponins and phlabotannins are present in all samples except control. Flavanoides, alkaloids and terpenoides were absent in all the samples. The results were in accordance with Pankaj *et al* (2013), coined the plant aloe vera is used in ayurvedic, homoeopathic and allopathic streams of medicine by which have a phyto and micronutrients.

CONCLUSION

The aloe vera application in dairy products being prepared as it has the highest therapeutic values. The aloe vera gel added yoghurt serves as a good vehicle for supplying biological active compounds in a palatable form. Use of aloe vera gel in the probiotic foods can be a promising trend towards use of herb as functional ingredients in the dairy food. Throughout the study concluded that employing naturally occurring vitamin C, phytonutrients from aloe vera gel with yoghurt found superior compared to other experimental samples, which found in good probiotic beverage along with good taste, which could essentially transfer to the consumer