PUBLIC HEALTH
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Original Research Article

Influence of Storage Conditions on Physico-Chemical Attributes of Strawberry–Aloe Vera Functional Gummies

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Article Information: Received: 10 October 2025 | Revised: 07 November 2025 | Accepted: 12 December 2025 | Published: January 09, 2026

Cite this article:
Chauhan J, Bandral JD, Sood M, Gupta N, Choton S, Langeh A, Bashir M, Dutta U. Influence of storage conditions on physico-chemical attributes of strawberry–aloe vera functional gummies. *Public Health Open Journal*. 2026;11(1):7–15. https://doi.org/10.17140/PHOJ.11.01.07

Abstract

The increasing demand for functional confectionery products has promoted the incorporation of bioactive ingredients to enhance nutritional and health benefits. In the present investigation, strawberry- aloe vera blended gummies were developed and evaluated for storage stability under ambient (25–30 °C) and refrigerated (4–8 °C) conditions over 90 days. Six formulations (T_0–T_6) with varying strawberry to aloe vera pulp ratios were analyzed at regular intervals for physico-chemical properties (moisture content, total soluble solids, titratable acidity, ash content, reducing sugars, and total sugars), microbial load, and sensory attributes. Moisture content increased significantly with higher aloe vera incorporation, with T_6 (0:100::Strawberry:Aloe vera) exhibiting the highest values. During storage, total soluble solids and titratable acidity showed a gradual increase, whereas ash content declined. Although reducing and total sugars decreased with increasing aloe vera levels, both parameters increased progressively during storage, likely due to polysaccharide hydrolysis and moisture loss. The findings indicate that aloe vera enrichment enhances moisture retention but influences quality attributes during storage. Refrigerated storage proved more effective in maintaining the physico-chemical stability of the developed functional gummies.

Keywords: *Strawberry-aloe vera gummies, storage stability, physico-chemical properties, quality.*

1. Introduction

Strawberries (Fragaria × ananassa) rank among the most popular berries consumed globally, appreciated for their pleasant sweetness, bright red appearance, and impressive nutritional profile. They provide abundant vitamin C, anthocyanins, flavonoids, and other polyphenols that not only define their sensory appeal but also impart functional health benefits. These bioactive constituents are widely recognized for their antioxidant capacity, anti-inflammatory potential, and protective effects against cardiovascular disorders (1). However, despite their nutritional value, strawberries are extremely perishable because of their high moisture level and delicate tissue structure. Significant post-harvest losses occur mainly due to microbial spoilage and enzymatic browning, which substantially limit their storage life under ambient conditions (2). Similarly, aloe vera (Aloe barbadensis Miller), a succulent species traditionally utilized in medicinal systems, has increasingly attracted attention as a functional food component. The inner leaf gel contains various bioactive substances, including polysaccharides (notably acemannan), vitamins, essential amino acids, enzymes, and phenolic compounds (3). These constituents demonstrate multiple biological activities such as antimicrobial, antioxidant, immunomodulatory, and wound-healing properties (4, 5). The incorporation of aloe vera gel into food formulations can enhance functional quality while also serving as a natural bio-preservative, thereby supporting improved shelf stability. In the realm of emerging functional food products, gummies have gained considerable popularity as an effective delivery vehicle in the nutraceutical and health-food industries (6). They offer a convenient, enjoyable, and consumer-acceptable medium for incorporating nutrients and bioactive ingredients. Fruit-based gummy formulations, particularly those fortified with aloe vera, present a novel strategy to enhance nutritional intake while catering to the preferences of health-conscious individuals (7). Nevertheless, the overall stability and quality of these products are significantly affected by storage parameters, especially temperature and humidity. The physico-chemical attributes of gummies such as moisture content, total soluble solids (TSS), ash content, titratable acidity, reducing sugars, and total sugars are highly susceptible to environmental variations (8). Although storage at ambient temperature (25–30 °C) is practical and economical, it tends to hasten deterioration processes, including oxidation, microbial growth, and unfavorable moisture changes. Conversely, refrigerated conditions (4–8 °C) help to retard degradative reactions, thereby extending shelf life and preserving sensory attributes more effectively (9). Given the increasing demand for plant-based functional snack options and the stability challenges they pose, it is essential to evaluate the influence of storage conditions on product quality. Accordingly, the present investigation was conducted to examine the impact of ambient and refrigerated storage on the physico-chemical, microbial, and sensory properties of strawberry–aloe vera blended gummies during storage. The outcomes of this study are anticipated to support product refinement and guide the establishment of suitable storage practices to improve shelf life and market viability of functional gummy products.

2. Material and Methods

2.1 Preparation of Control Gummies

For the formulation of treatment T_0 (control), gelatin was first hydrated in 100 ml of water for 5 minutes and subsequently heated at 70°C for an additional 5 minutes to achieve complete dissolution. A sugar syrup was then prepared by mixing citric acid, dissolved gelatin, permitted colouring agents, and flavouring compounds. The mixture was manually stirred for approximately 15 minutes while maintaining the temperature at 110 ± 2°C. The resulting hot gummy mass was poured into silicone moulds ($2 \times 1.5 \times 1$ cm) and refrigerated at 4°C for 6 hours to ensure proper gel setting. After solidification, the gummies were demoulded, packed in polypropylene (PP) pouches, and stored under refrigerated and ambient conditions for further analysis.

2.1.1 Preparation of Strawberry and Aloe Vera Gummies

For the blended formulations, gelatin was similarly soaked in 100 ml of water for 5 minutes and subsequently heated at 70°C for an additional 5 minutes to ensure complete dissolution. Six treatment combinations were prepared: T_1 (100:0::Strawberry:Aloe vera), T_2 (80:20), T_3 (60:40), T_4 (40:60), T_5 (20:80), and T_6 (0:100). The sugar–gelatin base was incorporated with the respective strawberry and aloe vera blends and cooked for approximately 15 minutes. Citric acid was then added and the mixture was further heated for 5 minutes at a controlled temperature of 110 ± 2°C.

The cooking endpoint was monitored using a handheld refractometer to ensure that the total soluble solids (TSS) ranged between 61 and 67°Brix. The hot gummy mass was poured into silicone moulds and allowed to set under refrigeration at 4°C for 6 hours. After complete setting, the gummies were demoulded, packed in polypropylene (PP) pouches, and stored at 4–8°C and 25–30°C for subsequent evaluation.

2.2 Physico-Chemical Parameters

2.2.1 Moisture content

Moisture content of fruit pulp and gummy was determined as per the standard procedure of (10). 5 g of weighed sample was taken in a moisture dish and kept in hot air oven at 50-60 °C until a constant weight was obtained. The loss of weight was expressed as per cent moisture, and per cent moisture content was calculated using the formula:

$$\text{Moisture content (per cent)} = \frac{\text{Initial weight (g)} - \text{Final weight (g)}}{\text{Initial weight (g)}}$$

2.2.2 Total soluble solids (TSS)

TSS was measured using a hand refractometer with three ranges: 0-32 °B, 28-62 °B, and 58-92 °B. The data were represented as degree Brix (oB) following the standard approach outlined in (11). The hand refractometer was calibrated with pure water before use.

2.2.3 Ash content

Ash content of sample was measured by standard method of (10). 5 ml of sample was transferred into a pre-weighed crucible and sample was ignited until no charred particles remained in the crucible. The crucible was then transferred into a muffle furnace at 600oC for 5 hrs or until white ash was obtained. The crucible was cooled in a desiccator and weighed to a constant weight. The difference in weight of silica crucibles with ash and empty crucible was calculated using the formula and expressed as per cent.

$$\text{Ash (per cent)} = \frac{\text{Weight of ash (g)} \times 100}{\text{Weight of sample (g)}}$$

2.2.4 Titratable acidity

The titratable acidity was determined by titrating a known volume of sample (10 ml) against a standard 0.1 N NaOH solution, using phenolphthalein as an indicator to achieve a little pink tint. The titratable acidity was determined as a percentage of citric acid (10).

$$\text{Acidity (\%)} = \frac{T \times N \times V \times Eq.Wt. \times 100}{W \times A \times 1000}$$

Where

T = Titre value, N = Normality of NaOH, V = Volume made, W = Weight of sample, A = Aliquot used

2.2.5 Reducing sugars

Lane and Eynon's (1923) volumetric method as detailed by (11) was followed for the calculation of reducing and total sugars. Measured quantity of sample (20 g) was taken in 250 ml volumetric flask to which 100 ml distilled water was added and neutralised with 40 per cent sodium hydroxide solution using phenolphthalein as indicator and clarified with 2 ml of 45 per cent neutral lead acetate for about 30 minutes. Excess of lead was removed by adding 5 ml of 22 per cent potassium oxalate. The volume was made to 250 ml and filtered through Whatman filter paper No. 4. The filtrate was titrated against 10 ml of standardised Fehling's solution, using methylene blue as an indicator, to a brick red precipitate for the determination of reducing sugars.

$$\text{Reducing sugars (\%)} = \frac{F \times D}{A \times W} \times 100$$

where,

F = Factor, D = Dilution, A = Aliquot used (ml), W = Weight or volume of sample (g or ml)

2.2.6 Total sugars

A measured aliquot (100 ml) of the above filtrate was taken in a 250 ml volumetric flask and was hydrolysed by adding 10 ml of 50 per cent HCl, kept overnight at room temperature, followed by neutralization with 40 per cent sodium hydroxide solution using phenolphthalein as indicator. The volume was made to 250 ml and titrated against Fehling's solution, as above, for total sugars and expressed as per cent total sugars. The percentage of reducing and total sugars was calculated using the equation:

$$\text{Total sugars (\%)} = \frac{F \times D}{A \times W} \times 100$$

where,

F = Factor, D = Dilution, A = Aliquot used (ml), W = Weight or volume of sample (g or ml)

3. RESULTS AND DISCUSSION

3.1 Moisture Content

A significant rise in moisture content was recorded among the treatments with increasing proportions of aloe vera in the strawberry–aloe vera blended gummies (Table 1). The maximum mean moisture content was observed in treatment T_6 (0:100::Strawberry:Aloe vera), registering 33.09 per cent under refrigerated storage and 33.04 per cent under ambient conditions. Conversely, the minimum moisture values were noted in T_1 (100:0::Strawberry:Aloe vera), showing 23.72 per cent and 23.66 per cent under refrigerated and ambient storage, respectively. The increase in moisture content can be attributed to the inherently high water content of aloe vera, which ranges from 96.62 per cent to 99.61 per cent [**?**, **?**]. Comparable findings were reported by [**?**], who documented enhanced moisture levels following aloe vera incorporation in guava–aloe vera jelly. Similarly, [?] observed reduced moisture content when the proportion of aloe vera decreased in dragon fruit–aloe vera jelly formulations.

Over the 90-day storage period, a gradual reduction in moisture content was noted in the blended gummies, declining from 29.35 per cent to 28.58 per cent under refrigerated conditions and to 28.52 per cent under ambient storage. These findings align with the results reported by [?, ?, ?] in studies on pomegranate gummy candy, guava–carrot jelly, and dragon fruit jelly, respectively. The authors suggested that moisture loss during storage may be associated with repeated opening of packages for sampling purposes. Similar decreasing trends were also documented by [?] in strawberry jam, [?] in guava and pineapple jelly, and [?] in guava–aloe vera jelly. Furthermore, [?, ?] indicated that interactions between citric acid and gelatin during thermal processing may influence moisture retention in gummy formulations. Additionally, [?] reported that gelatin-based products tend to retain higher initial moisture; however, they are more susceptible to gradual moisture loss over time due to evaporation from the gelatin network.

3.1.1 Total Soluble Solids (TSS)

Total soluble solids (TSS) represent an important quality parameter in fruit-based products, as they are closely associated with sweetness, flavour profile, and overall consumer acceptance. In the present investigation, the highest mean TSS value of 67.00°Brix was observed in treatment T_0 (control), while the lowest value of 64.89°Brix was recorded in T_6 (0:100; Strawberry:Aloe vera) under both refrigerated and ambient storage conditions. The reduction in TSS with increasing levels of aloe vera may be attributed to its comparatively lower soluble solids content than strawberries. Similar findings were reported by [?], who observed a significant decrease in TSS following the incorporation of aloe vera pulp in guava–aloe vera jam.

An increasing trend in TSS was observed during the storage period (Table 4). The initial TSS value of 66.11°Brix increased to 66.76°Brix under refrigerated conditions and 66.79°Brix under ambient storage after 90 days. This increase may be attributed to the hydrolysis of complex carbohydrates into simpler soluble sugars and the conversion of certain insoluble solids into soluble forms [?, ?]. Comparable trends were reported by [?] in karonda jelly, [?] in guava jelly bars, [?] in aloe vera–ginger–sweet lime RTS beverage, [?] in guava jam, [?] in wood apple jelly, [?] in dragon fruit jelly, and [?] in guava–aloe vera jam under different storage conditions.

3.2 Ash Content

Ash content represents the total mineral residue remaining after complete combustion of organic matter in a food sample. In the present study, a significant ($p < 0.05$) decrease in ash content was observed in strawberry–aloe vera blended gummies with increasing incorporation of aloe vera pulp. The control treatment T_0, which did not contain fruit pulp, exhibited the lowest ash content. The highest ash value of 0.49 per cent was recorded in treatment T_1 (100:0; Strawberry:Aloe vera), whereas the minimum value of 0.14 per cent was observed in T_0 under both refrigerated and ambient storage conditions. These findings are consistent with those reported by [?] and [?], who also documented reductions in ash content with higher incorporation of aloe vera in dragon fruit and guava jellies, respectively.

Storage duration also influenced ash content, with a gradual decline observed over the 90-day storage period. The average ash content decreased from 0.37 per cent to 0.30 per cent under refrigerated storage and to 0.28 per cent under ambient conditions. Among the treatments, T_1 maintained the highest mean ash values of 0.45 per cent (refrigerated) and 0.44 per cent (ambient), while T_0 recorded the lowest mean value of 0.12 per cent under both storage conditions. Similar declining trends during storage were reported by [?] in date jelly and by [?] in guava–aloe vera jam, where the decrease was attributed to the degradation of mineral components and associated organic substances during prolonged storage.

3.3 Titratable Acidity

The titratable acidity values of strawberry–aloe vera blended gummies are presented in Table 4. A significant ($p < 0.05$) variation in acidity was observed among the treatments with different levels of aloe vera incorporation, as well as during the three-month storage period under varying temperature conditions. The highest acidity (0.76 per cent) was recorded in treatment T_1 (100:0; Strawberry:Aloe vera), whereas the lowest value (0.42 per cent) was observed in the control treatment T_0 under both refrigerated and ambient storage conditions. These observations are consistent with the findings of [?], who reported a decrease in acidity with increasing levels of aloe vera in guava–aloe vera jam, attributing the reduction to the comparatively lower natural acidity of aloe vera than guava.

During the 90-day storage period, titratable acidity showed a gradual increase, rising from an initial value of 0.67 per cent to 0.73 per cent under refrigerated storage and 0.72 per cent under ambient conditions. This increase may be associated with the formation of or-

Table 1. Effect of blending and storage period on moisture (%) content of strawberry and aloe vera blended gummies

3*Treatments	Refrigerated storage					Ambient storage				
	Storage period (Days)					Storage period (Days)				
	0	30	60	90	Mean	0	30	60	90	Mean
T_0	29.70	29.48	29.21	29.04	**29.36**	29.70	29.37	28.19	28.98	**29.06**
T_1	24.19	23.85	23.53	23.31	**23.72**	24.19	23.80	23.46	23.20	**23.66**
T_2	26.69	26.38	26.08	25.82	**26.24**	26.69	26.33	25.94	25.79	**26.19**
T_3	29.53	29.30	29.13	28.87	**29.21**	29.53	29.27	29.06	28.80	**29.17**
T_4	30.18	29.97	29.66	29.39	**29.80**	30.18	29.91	29.58	29.33	**29.75**
T_5	31.71	31.56	31.23	30.92	**31.36**	31.71	31.48	31.15	30.88	**31.31**
T_6	33.45	33.22	32.96	32.73	**33.09**	33.45	33.14	32.87	32.68	**33.04**
Mean	**29.35**	**29.11**	**28.83**	**28.58**		**29.35**	**29.04**	**28.61**	**28.52**	

Storage conditions (A)	= 0.03
Storage period (B)	= 0.02
Treatments (C)	= 0.06
A × B	= 0.03
A × C	= 0.05
B × C	= 0.06
A × B × C	= 0.09

Table 2. Effect of blending and storage period on TSS (°Brix) content of strawberry and aloe vera blended gummies

3*Treatments	Refrigerated storage					Ambient storage				
	Storage period (Days)					Storage period (Days)				
	0	30	60	90	Mean	0	30	60	90	Mean
T_0	67.00	67.11	67.45	67.80	**67.34**	67.00	67.13	67.48	67.84	**67.36**
T_1	66.90	67.21	67.57	67.93	**67.40**	66.90	67.24	67.62	68.00	**67.44**
T_2	66.83	66.92	67.00	67.23	**67.00**	66.83	66.96	67.05	67.28	**67.03**
T_3	66.26	66.53	66.83	66.97	**66.65**	66.26	66.59	66.91	67.02	**66.70**
T_4	65.74	65.91	66.06	66.38	**66.02**	65.74	65.98	66.13	66.29	**66.04**
T_5	65.17	65.24	65.48	65.70	**65.40**	65.17	65.33	65.56	65.73	**65.45**
T_6	64.89	64.99	65.13	65.29	**65.08**	64.89	65.04	65.18	65.34	**65.11**
Mean	**66.11**	**66.27**	**66.50**	**66.76**		**66.11**	**66.32**	**66.56**	**66.79**	

Storage conditions (A)	= 0.01
Storage period (B)	= 0.01
Treatments (C)	= 0.02
A × B	= 0.02
A × C	= 0.02
B × C	= 0.03
A × B × C	= NS

Table 3. Effect of blending and storage period on ash (%) content of strawberry and aloe vera blended gummies

3*Treatments	Refrigerated storage					Ambient storage				
	Storage period (Days)					Storage period (Days)				
	0	30	60	90	Mean	0	30	60	90	Mean
T_0	0.14	0.13	0.11	0.09	**0.12**	0.14	0.13	0.11	0.08	**0.12**
T_1	0.49	0.47	0.43	0.40	**0.45**	0.49	0.46	0.41	0.40	**0.44**
T_2	0.44	0.41	0.38	0.35	**0.40**	0.44	0.41	0.38	0.34	**0.39**
T_3	0.42	0.39	0.36	0.33	**0.38**	0.42	0.38	0.36	0.31	**0.37**
T_4	0.39	0.35	0.32	0.30	**0.34**	0.39	0.35	0.32	0.30	**0.34**
T_5	0.36	0.33	0.31	0.27	**0.32**	0.36	0.33	0.30	0.26	**0.31**
T_6	0.33	0.31	0.29	0.28	**0.30**	0.33	0.31	0.28	0.26	**0.30**
Mean	**0.37**	**0.36**	**0.33**	**0.30**		**0.37**	**0.34**	**0.31**	**0.28**	

Storage conditions (A)	= NS
Storage period (B)	= 0.01
Treatments (C)	= 0.01
A × B	= NS
A × C	= 0.01
B × C	= NS
A × B × C	= 0.02

ganic acids resulting from the degradation of ascorbic acid during storage [**?**]. Similar increasing trends were reported by [**?**] in karonda jelly, [**?**] in guava jelly bars, [**?**] in dragon fruit jelly, and [**?**] in guava–aloe vera jam stored under different temperature conditions.

3.4 Reducing Sugars

A gradual reduction in reducing sugar content was observed with increasing levels of aloe vera incorporation in the strawberry–aloe vera blended gummies (Table 5). Under refrigerated storage, reducing sugars decreased from 24.76 per cent in treatment T (100:0::Strawberry:Aloe vera) to 19.37 per cent in treatment T (0:100::Strawberry:Aloe vera). Similarly, under ambient storage conditions, the values declined from 24.57 per cent to 19.19 per cent across the treatments. The highest mean reducing sugar content was recorded in treatment T, with values of 24.76 per cent under refrigerated storage and 24.57 per cent under ambient conditions. In contrast, the lowest mean values were observed in treatment T, registering 19.37 per cent and 19.19 per cent under refrigerated and ambient storage, respectively. Throughout the 90-day storage period, reducing sugar levels exhibited a gradual increase, rising from an initial value of 21.40 per cent to 22.24 per cent under refrigerated conditions and 22.18 per cent under ambient storage. This increase may be attributed to the conversion of non-reducing sugars into reducing sugars, as a decline in non-reducing sugars directly contributes to a corresponding rise in reducing sugars (23). Additionally, the hydrolysis of complex polysaccharides such as pectin and gelatinized starch might have contributed to the elevated sugar concentration over time. Comparable results were reported by (24) in karonda jelly, (29) in pomegranate–sapota jelly, and (30) in sapota–beetroot jelly. Further support for this trend was provided by (31) and (32), who documented an increase in reducing sugars during prolonged storage of various fruit jams, including mango jam.

3.5 Total Sugars

As presented in Table 6, the total sugar content of strawberry–aloe vera blended gummies decreased with increasing levels of aloe vera in the formulations. Under refrigerated storage, total sugars declined from 55.03 per cent to 40.66 per cent, while under ambient conditions they decreased from 55.12 per cent to 40.74 per cent. The highest mean total sugar content was recorded in treatment T_1 (100:0; Strawberry:Aloe vera), with values of 55.03 per cent under refrigerated storage and 55.12 per cent under ambient conditions. In contrast, the lowest values were observed in T_6 (0:100; Strawberry:Aloe vera), registering 40.66 per cent and 40.74 per cent under refrigerated and ambient storage conditions, respectively.

During the 90-day storage period, a slight but significant increase in total sugar content was observed. The values increased from an initial 48.91 per cent to 49.84 per cent under refrigerated storage and to 50.00 per cent under ambient conditions by the end

Table 4. Effect of blending and storage period on titratable acidity (%) of strawberry and aloe vera blended gummies

3*Treatments	Refrigerated storage					Ambient storage				
	Storage period (Days)					Storage period (Days)				
	0	30	60	90	Mean	0	30	60	90	Mean
T_0	0.42	0.45	0.48	0.50	**0.46**	0.42	0.44	0.47	0.49	**0.46**
T_1	0.76	0.77	0.79	0.81	**0.78**	0.76	0.77	0.78	0.80	**0.78**
T_2	0.74	0.75	0.78	0.80	**0.77**	0.74	0.75	0.77	0.79	**0.76**
T_3	0.72	0.74	0.76	0.78	**0.75**	0.72	0.74	0.75	0.77	**0.75**
T_4	0.71	0.73	0.74	0.77	**0.74**	0.71	0.72	0.73	0.75	**0.73**
T_5	0.68	0.69	0.71	0.73	**0.70**	0.68	0.69	0.70	0.72	**0.70**
T_6	0.64	0.66	0.69	0.70	**0.67**	0.64	0.65	0.67	0.69	**0.66**
Mean	**0.67**	**0.68**	**0.71**	**0.73**		**0.67**	**0.68**	**0.69**	**0.72**	

Storage conditions (A) = NS
Storage period (B) = 0.01
Treatments (C) = 0.02
A × B = NS
A × C = NS
B × C = 0.03
A × B × C = NS

Table 5. Effect of blending and storage period on reducing sugars (%) content of strawberry and aloe vera blended gummies

3*Treatments	Refrigerated storage					Ambient storage				
	Storage period (Days)					Storage period (Days)				
	0	30	60	90	Mean	0	30	60	90	Mean
T_0	20.24	20.61	20.88	21.17	**20.89**	20.24	20.58	20.88	21.14	**20.71**
T_1	24.17	24.38	24.83	25.06	**24.76**	24.17	24.34	24.76	25.01	**24.57**
T_2	22.48	22.70	23.02	23.31	**23.01**	22.48	22.66	22.98	23.27	**22.85**
T_3	21.98	22.23	22.46	22.72	**22.47**	21.98	22.19	22.40	22.68	**22.31**
T_4	21.21	21.63	21.94	22.11	**21.89**	21.21	21.56	21.89	22.04	**21.68**
T_5	20.89	21.12	21.47	21.68	**21.42**	20.89	21.11	21.35	21.59	**21.24**
T_6	18.84	19.06	19.41	19.63	**19.37**	18.84	19.01	19.34	19.56	**19.19**
Mean	**21.40**	**21.68**	**22.00**	**22.24**		**21.40**	**21.64**	**21.94**	**22.18**	

Storage conditions (A) = 0.01
Storage period (B) = 0.02
Treatments (C) = 0.03
A × B = 0.01
A × C = 0.02
B × C = 0.02
A × B × C = 0.03

of storage. This increase may be attributed to moisture loss and the conversion of starch into simpler sugars during storage. Similar increasing trends were reported in earlier studies, including sapota jelly [**?**], wood apple jelly [**?**], pomegranate–sapota jelly [**?**], and dragon fruit jelly [**?**] stored under different storage conditions. The breakdown of insoluble polysaccharides and starch into soluble sugars during storage likely contributed to the overall rise in total sugar content. Furthermore, this increase may also be associated with the simultaneous rise in total soluble solids observed in the gummies [**?**].

4. DECLARATION

The authors declare that there is no conflict of interest.

Table 6. Effect of blending and storage period on total sugars (%) content of strawberry and aloe vera blended gummies

3*Treatments	Refrigerated storage					Ambient storage				
	Storage period (Days)					Storage period (Days)				
	0	30	60	90	Mean	0	30	60	90	Mean
T_0	52.73	53.01	53.59	53.81	**53.29**	52.73	53.05	53.67	53.94	**53.35**
T_1	54.49	54.83	55.27	55.53	**55.03**	54.49	54.96	55.39	55.62	**55.12**
T_2	53.65	53.97	54.18	54.40	**54.05**	53.65	54.01	54.30	54.58	**54.14**
T_3	49.11	49.38	49.54	50.92	**49.49**	49.11	49.45	49.67	51.04	**49.82**
T_4	48.87	49.02	49.36	49.78	**49.26**	48.87	49.08	49.45	49.90	**49.33**
T_5	43.48	43.66	43.81	44.17	**43.78**	43.48	43.71	43.92	44.23	**43.84**
T_6	40.06	40.44	40.85	41.29	**40.66**	40.06	40.49	40.97	41.42	**40.74**
Mean	**48.91**	**49.19**	**49.51**	**49.84**		**48.91**	**49.25**	**49.62**	**50.10**	

Storage conditions (A)	= 0.02
Storage period (B)	= 0.02
Treatments (C)	= 0.03
A × B	= 0.03
A × C	= 0.04
B × C	= 0.06
A × B × C	= 0.08

5. ACKNOWLEDGEMENTS

Authors are highly grateful to Division of Post Harvest Management, Faculty of Horticulture, SKUAST-J (JK), India, and Division of Biochemistry, Faculty of Basic Sciences, SKUAST-J (JK), India, for providing the experimental material to conduct the research work.

ABBREVIATIONS

TSS: Total soluble solids
T_0–T_6: Treatment formulations with varying strawberry–aloe vera ratios
ml: millilitre
w/w: weight by weight
mg: milligram
Eq. Wt.: Equivalent weight

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