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# Producing Diet Strained Kefir Using Aloe vera and Dill Powders

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ABSTRACT: Kefir is one of the most widely consumed fermented milk products, which has a positive effect on health due to its high nutritional value. Consumption of diet kefir lowers blood cholesterol, but with the reduction of fat, the strength of kefir texture also decreases. In this study, dill and aloe vera powders were used at three levels of 0.5, 0.75 and 1% each and the physicochemical and sensory properties of kefir were investigated. All samples were produced under the same conditions and stored at 4 ° C. Acidity, pH, syneresis, viscosity, dry matter, texture, color, and sensory tests were performed on the samples. The results showed that the pH of all samples showed a decreasing trend with increasing fiber content ($p < 0.01$). Also, by increasing the amount of fiber, the acidity of the samples increased significantly ($p < 0.01$). The results of dry matter content showed that with increasing fiber content, kefir dry matter increased. During increasing the concentration of dill and aloe vera powders, the syneresis decreased ($p < 0.01$). The results obtained from the evaluation of viscosity and texture showed that by increasing dill and aloe vera powders, the amount of these two parameters increased. The results obtained from the color analysis of the samples showed that by increasing the amount of dill and aloe vera powders, the b * index increased and the L * and a * index decreased. The results of statistical analysis showed that the increase in fiber content significantly affected odor, taste, color, texture, and overall acceptance of kefir samples ($p < 0.01$). In general, the results showed that the addition of dill and aloe vera powders to kefir improved the physical, chemical, and sensory properties of kefir. The most desirable treatment introduced by the panelist was the treatment containing 1% dill powder + 0.5% aloe vera powder. Therefor the use of dill and aloe vera powders to improve the properties of kefir is recommended.

**Keywords**: Aloe vera, Dill, Kefir, Physicochemical Properties, Strained Kefir, Sensory Properties.

## Introduction

Functional foods are products that, in addition to providing basic nutrition, increase the level of health of people, and according to the awareness of consumers, new advances in the production of such foods are made day by day (Ashwell, 2004; Maqsood *et al*., 2020). Among the functional foods, foods containing probiotic microorganisms are of special importance. Probiotics are actually a number of living microbial compounds that, when used in food, have beneficial effects on human health. Probiotics are now recognized as the top functional food products, which are being developed by nutritionists (Guo, 2013). Consumption of functional products has been increasing worldwide over the past decade. The reason for this may be consumers' attention to useful and healthy products. Among these, fermented dairy products, especially beverages or kefir, with their many nutritional properties and special

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probiotic groups, have received more attention from food researchers (Guzel-Seydim *et al*., 2011; Butnariu and Sarac, 2019).

Kefir is a unique dairy product that is obtained by the fermentation of milk lactose in alcohol and as a result of the activity of equal proportion of lactic acid of bacteria and yeasts in milk. Considering the known health effects of kefir grains, such as eliminating the problem of lactose intolerance, stimulating the immune system, lowering cholesterol, reducing the risk of cancer and its antioxidant and anti-mutant effect, studies on the application of this product is increasing(Garrote *et al*., 2001; Simova *et al*., 2002).The difference between kefir and other fermented products is that in this drink, there are many types of active and live probiotic bacterial families, which have beneficial effects on human health by continuing their activity along the gastrointestinal tract. The most famous of these are the families *Bifidobacterium*, *Luconostocus*, *Lactobacillus* and *lactic acid bacteria*. In addition, there are different classes of beneficial yeasts such as *Fermentans*, *Saccharomyces* and *Kazachstania*, which together with kefir bacteria, during the milk fermentation process, produce various beneficial and bioactive compounds and are effective in improving the body's mechanisms(Lopitz-Otsoa *et al*., 2006; Garofalo *et al*., 2015).Another ingredient in kefir is kefiran, which in addition to creating a pleasant texture in kefir drink, disables the activity cycle of cancer cells and prevents intestinal inflammation by reducing the activity of intestinal pathogenic bacteria. Also, the presence of more kefiran in the intestine will help regulate the level of fat and blood sugar. Also, the yeasts in kefir are able to make folic acid (Rodrigues et al., 2005; Moradi and Kalanpour, 2019).

Dill (*Anethum graveolens*) is an annual herb in the celery family Apiaceae. It is the only species in the genus *Anethum*. Dill is grown widely in Eurasia, where its leaves and seeds are used as a herb or spice for flavoring food (Mousavi *et al*., 2021). Among the chemical compounds in dill are limonene and caraway. In addition, Flanders are present in dill essential oil and the amount of carvone is about 40 to 60%. Dill has been used to treat gastrointestinal problems since ancient times. Other health effects include antimicrobial, antispasmodic, anti-lipid, and various biological properties such as appetite suppressant, anti-flatulence, anti-jaundice, total cholesterol, LDL and triglyceride lowering, HDL enhancer, anti-cancer, and anti-oxidant are previously reported (Stavri and Gibbons, 2005; Al-Snafi, 2014; Mirhosseini *et al*., 2014; Goodarzi *et al*., 2016). The active ingredients of dill essential oil, including the two major compounds carvone and limonene, may have antioxidant effects, stabilizing liver cell membranes and reducing the release of enzymes into the blood (Selen Isbilir and Sagiroglu, 2011; Naidu *et al*., 2016).

Aloe vera is native to Africa and has been used for a long time because of its beneficial anti-inflammatory, antimicrobial, wound healing, and anti-tumor effects. The gel of this plant has been used to treat infectious wounds and to repair burns and cuts. Reducing glucose, blood cholesterol, relieving joint pain, and strengthening the body's immune system are other notable properties of this plant. Antioxidant compounds in the form of vitamins A, B, C, E, and essential fatty acids are also found in different parts of this plant (Hamman, 2008; Ahlawat and Khatkar, 2011; Nicolau-Lapena *et al*., 2021).

Numerous studies have been conducted on the use of dill and aloe vera in the production of functional foods (Ivanova *et al*., 2020; Mashau *et al*., 2020; Ikram *et al*., 2021; Tizghadam *et al*., 2021). However, no studies have been conducted on the simultaneous effect of dill and aloe vera in kefir. Therefore, the aim of this study was to add aloe vera and dill powder in different proportions in the formulation of diet kefir and to determine the physicochemical and sensory properties of diet kefir.

## Materials and Methods

### - *Materials*

In order to carry out this research, raw milk was purchased from Pegah (Golestan, Iran). The kefir grains used in this study were obtained from Hanssen co. (LAF4). Dill and aloe vera were purchased fresh from the local market, their impurities removed, and then washed. Dill and aloe vera, after drying at 65 °C in an oven, were powdered and passed through a sieve with 18 mesh.

### - *Sample preparation*

In order to prepare diet kefir, raw milk was heated at 85 °C for 30 minutes and then allowed to cool to 20 °C. Kefir grains were poured into this milk and the next day a soft paste was formed in the milk. The curd milk was passed through a clean strainer and the kefir grains were transferred to another container for further fermentation (Atalar, 2019). Aloe vera and dill powder were added to kefir in different proportions according to Table 1 and kept for one week in disposable containers with lids at 4 °C. Kefir without any additives was also used as a control sample. Kefir production flowchart has depicted in Figure 1.

### - *pH*

Using a pH meter, the pH of the samples was obtained at 25 °C. It is noteworthy that the pH meter was calibrated with buffers 4 and 7 before the test (Öner *et al*., 2010).

### - *Acidity*

The acidity of the treatments (according to Dornic degree) was based on titration with 0.1 N sodium hydroxide in the presence of phenolphthalein reagent until the purple color was obtained (Assadi *et al*., 2000).

**Table 1.** Treatments tested in this research

| Treatment | Description |
|---|---|
| Control | 0% dill powder + 0% aloe vera powder |
| $T_1$ | 0.5 % dill powder + 0.5 % aloe vera powder |
| $T_2$ | 0.5 % dill powder + 0.75 % aloe vera powder |
| $T_3$ | 0.5% dill powder + 1 % aloe vera powder |
| $T_4$ | 0.75% dill powder + 0.5 % aloe vera powder |
| $T_5$ | 0.75 % dill powder + 0.75 % aloe vera powder |
| $T_6$ | 0.75 % dill powder + 1% aloe vera powder |
| $T_7$ | 1% dill powder + 0.5 % aloe vera powder |
| $T_8$ | 1% dill powder + 0.75% aloe vera powder |
| $T_9$ | 1% dill powder + 1% aloe vera powder |

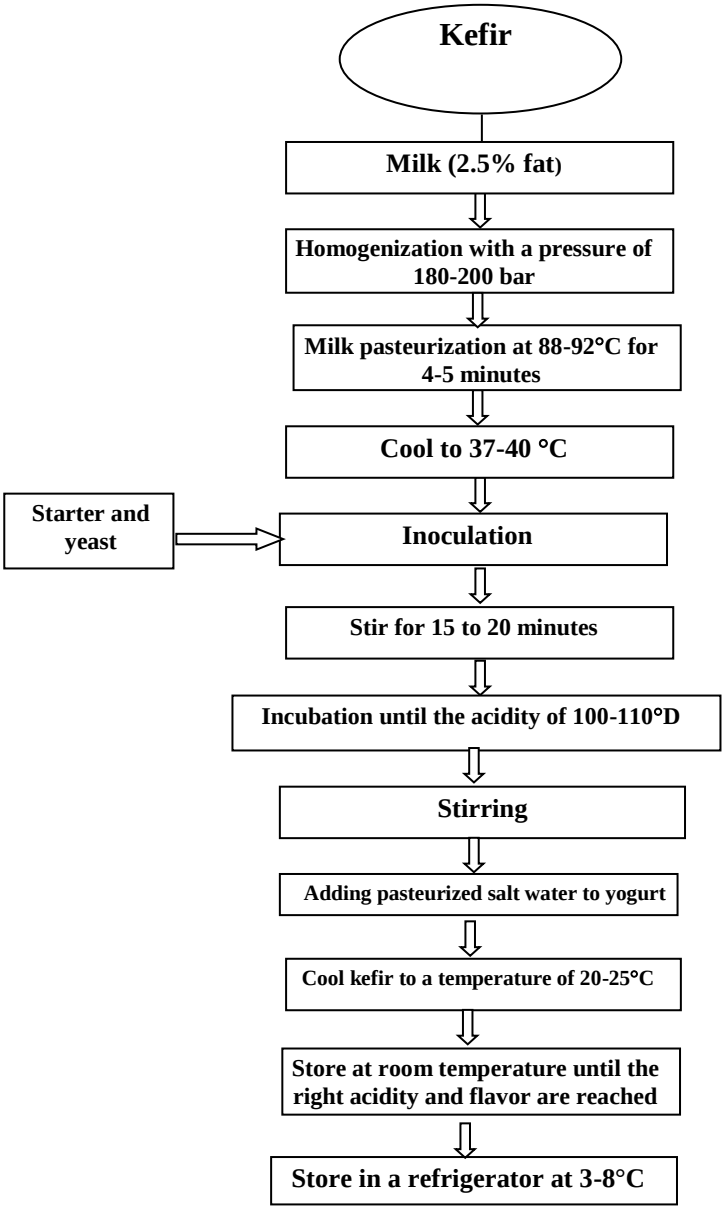


**Fig. 1.** Kefir production flowchart

- ***Fat content***

In order to measure milk fat, 10 ml of 90% sulfuric acid was poured into a butyrometer and 11.3 g of sample was added. Then 1 ml of isoamyl alcohol was added and tightly closed in a butyrometer. The butyrometer was then shaken to dissolve the sample and acid, and after homogenizing the contents, it was placed in a centrifuge (for 5 minutes at a speed of 1200 rpm at 40 to 60 ° C). Butyrometer was removed and fat percentage was reported (Irigoyen *et al*., 2005).

- ***Non-fat Dry Matter***

3 g of the sample was weighed in a metal container and weighed, poured, and placed in an oven. The container containing the sample was taken out of the oven and weighed in the desiccator after cooling. This was done until the weight of the container containing the sample was fixed. The amount of dry matter of the sample was obtained from the difference

between the two weights (Ertekin and Guzel-Seydim, 2010).

- ***Fiber***

1 g of the dried sample was weighed and transferred to special fiber measuring bags and the acid digestion steps were performed with 0.13 M hydrochloric acid. Then wash with warm water and re-digest the alkali with 0.13 M potassium hydroxide and wash until complete removal of potassium hydroxide. The dried sample bags are placed in an oven at 100 ° C, placed inside a fixed weight plate and gently burned on a flame, then placed in a 550 ° C oven for 2 hours and weighed again. The number obtained from the following formula was calculated (Baú, Garcia *et al*., 2014):

Fiber (%) = Weighing difference of two drying steps - Weight difference between the two stages of ash × 100

- ***Syneresis***

In order to measure this index, 15 g of kefir sample was weighed in centrifuge tubes and centrifuged in a centrifuge at 3500 rpm for 10 minutes. Serum isolated from the sample, weighing and watering percentage were calculated according to the following formula (Bensmira and Jiang, 2012).

Syneresis (%) = Serum weight (g) / yoghurt weight (g) ×100

- ***Viscosity***

The viscosity of kefir samples was measured by a viscometer at 4 ° C. After preliminary experiments, spindle number 3 was selected as the most suitable spindle and rpm = 20 as the desired rotational speed. The viscosity of all samples was reported after 20 seconds in centipoise units (cρ)(Glibowski and Kowalska, 2012).

- ***Texture***

Texture parameter measurement including maximum force (stiffness) was selected using a tissue analyzer with an aluminum cylinder probe with a diameter of 20 mm, a penetration rate of 1 mm per second and a penetration depth of 30 mm (Gul *et al*., 2018).

- ***Color***

Color evaluation was performed by surface colorimetry of the homogenized sample using Laviband and the results were expressed as color indices L *, a * and b *(Vimercati *et al*., 2020).

- ***Sensory evaluation***

After the basic training, 15 people were selected as the trained panelists and using the 5-point hedonic method (very weak, weak, average, good, very good) in 5 sections of taste, texture, odor, color, and overall acceptance. Prepared kefir samples were evaluated. In this method, a score of 5 indicated that the sample was excellent and a score of 1 indicated that the sample was very bad (Puerari *et al*., 2012).

- ***Statistical analysis***

All experiments were performed in three replications in a completely randomized design and the results were expressed as mean values and standard deviation. The difference between the values in the samples was done using analysis of variance of grouping means by Duncan method. The mentioned analyzes were performed by SPSS software version 18.0.

## Results and Discussion

- ***Results of physicochemical properties of raw materials***

Physicochemical properties of raw milk including fat, protein, dry matter, acidity

and pH were 3.5%, 3.12%, 8.49%, 13°D and 6.0, respectively. According to the results, the amount of raw materials used in raw milk was within the national standard of Iran No. 164.The results of fiber in dill and aloe vera powders were 1.0 and 13.0 g/100g, respectively. The results obtained from the amount of fiber in the powders used in this study show that aloe vera has a higher amount of fiber than dill.

- ***pH and acidity***

Table 2 shows the effect of using dill and aloe vera powders on the pH and acidity of kefir during storage at refrigerated temperature. As can be seen, the pH of all treatments containing dill and aloe vera powders decreased significantly compared to the control sample ($p < 0.05$), which could be due to better conditions created by these compounds for kefir-starter bacteria and produce more acid in these samples, which leads to lower pH.In general, the reason for the decrease in pH of the activity of bacteria in kefir is probiotic bacteria, which increase the number of live bacteria, resulting in the breakdown of lactose and increase the production of lactic acid. Based on the results, with increasing the concentration of dill and aloe vera powders, a decreasing trend in pH was observed. The lowest pH was observed in T9 treatment which contained 1% dill powder and 1% aloe vera powder. In fact, the cause of lowering the pH of kefir is an increase in dry matter and stimulation of the metabolic activity of starter bacteria (Milani and Koocheki, 2011). Also, starters that grow in milk with higher solids have a shorter reproduction time compared to samples with fewer solids (Öner *et al*., 2010). On the other hand, this decrease in pH is due to the activity of kefir bacteria and as a result, the production of acid along with the strengthening of the milk protein network (Özer and Robinson, 1999). The highest acidity was observed in T9 treatment which contained 1% dill powder and 1% aloe vera powder. Based on the results, with increasing the concentration of dill and aloe vera powders, an increasing trend in acidity was observed. The cause of increased acidity can be an increase in dry matter of the product and stimulation of metabolic activity of acid-starting starter bacteria.

**Table 2.** pH and acidity in kefir samples containing different concentrations of dill and aloe vera

| Treatment | pH | Acidity (°D) |
|---|---|---|
| Control | 4.285±0.019$^{a}$ | 71.100±0.611$^{a}$ |
| $T_1$ | 4.27±0.009$^{b}$ | 71.130 ±0.153$^{b}$ |
| $T_2$ | 4.258±0.008$^{c}$ | 72.900 ±0.005$^{c}$ |
| $T_3$ | 4.232±0.008$^{d}$ | 76.900±0.003$^{d}$ |
| $T_4$ | 4.255±0.015$^{e}$ | 74.800±0.005$^{e}$ |
| $T_5$ | 4.197±0.017$^{f}$ | 76.800±0.108$^{f}$ |
| $T_6$ | 4.173±0.009$^{g}$ | 83.130±0.527$^{g}$ |
| $T_7$ | 4.196±0.014$^{h}$ | 77.460±0.561$^{h}$ |
| $T_8$ | 4.141±0.019$^{i}$ | 85.130±0.527$^{i}$ |
| $T_9$ | 4.141±0.009$^{j}$ | 87.460±0.561$^{j}$ |

Lowercase letters indicate differences between treatments at the 1% confidence level

- ***Non-fat Dry Matter***

As shown in Figure 2, as the amount of fiber increases, the percentage of dry matter in kefir increases. According to the results, the amount of dry matter in kefir sample containing 1% dill powder and 1% aloe vera powder was higher than other samples. The reason for this is the higher percentage of dill and aloe vera powders and the compounds in it, including fiber, which increase the dry matter content of kefir samples. Higher dry matter content is considered desirable due to reduced dehydration and improved tissue properties (Sahan *et al*., 2008). The increase in dry matter can be attributed to the hydration or absorption of fiber water (Waldron, Parker *et al*. 2003). The hydration properties of dietary fibers depend on the chemical structure of the

existing polysaccharides and some other parameters such as pH and temperature (Elleuch *et al*., 2011). Sahana *et al*. (2008) also showed that increasing β-glucan increases kefir dry matter, which confirms the results of this study (Sahan *et al*., 2008).

**- *Syneresis***

The results of Figure 3 show the effect of using dill and aloe vera powders on the syneresis rate of kefir during storage at refrigerated temperatures. As can be seen, the rate of syneresis in all treatments containing dill and aloe vera powders was significantly reduced ($p < 0.01$) compared to the control sample. Based on the results, with increasing the concentration of dill and aloe vera powders, a decreasing trend was observed in the amount of syneresis. The lowest syneresis was observed in T9 treatment which contained 1% dill powder and 1% aloe vera powder. One of the major disadvantages of kefir is syneresis, which is actually the appearance of serum or whey on the surface of kefir, which is, in fact, a common defect in the storage of fermented dairy products. syneresis in kefir occurs due to the shrinkage of the three-dimensional structure of the protein network, which leads to a decrease in the binding power of whey proteins and their exit from kefir (Lucey, 2004). Manufacturers try to reduce syneresis by increasing milk soluble solids or by adding stabilizers such as starches and gums. It should also be noted that the interaction of hydrocolloids with milk proteins can sometimes lead to a decrease in the properties of kefir. Fiber replacement of the aqueous phase strengthens the gel network. By adding fiber to the whole kefir, a strong network is formed between the fiber and the milk proteins. Also, the ability of fibers to bind to water molecules and interfere with milk components, especially proteins, and thus the stability of the protein network can prevent the free movement of water and lead to a reduction in syneresis (Mei *et al*., 2017). Increased gel strength and decreased syneresis due to increased carrot fiber have been reported by McCann *et al*. (2011) in low-fat kefir. They claimed that carrot fiber lies between protein masses as part of the milk gel network. They also stated that the addition of carrot fiber reduced the syneresis of low-fat kefir, which is consistent with the results of the present study (McCann *et al*., 2011).

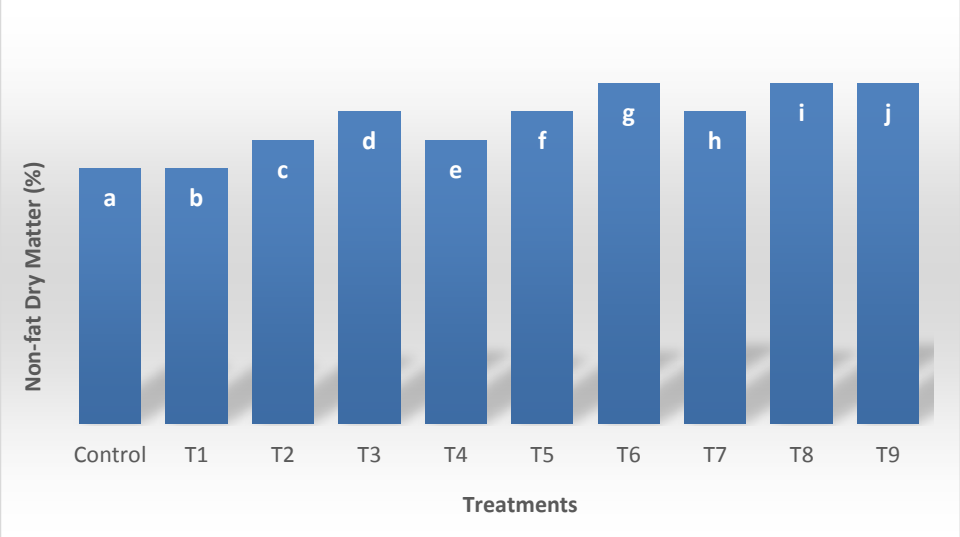


**Fig. 2.** Non-fat dry matter in kefir samples containing different concentrations of dill and aloe vera.

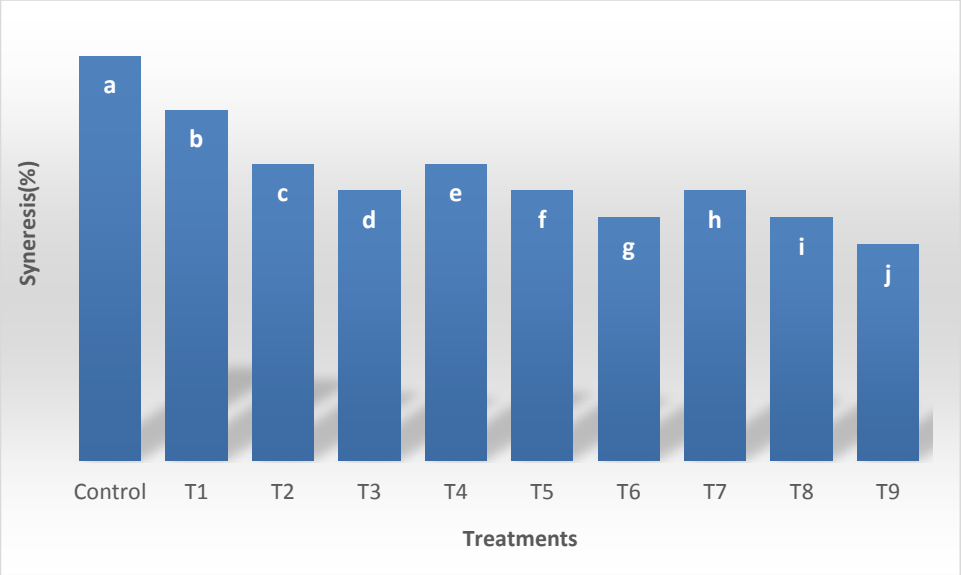


**Fig. 3.** Syneresis in kefir kefir samples containing different concentrations of dill and aloe vera.

- ***Viscosity***

Viscosity results from the use of dill and aloe vera powders in kefir after one week of refrigeration, are shown in Figure 4. Based on the results, with increasing the concentration of dill and aloe vera powders, an increasing trend in viscosity was observed ($p < 0.01$). The lowest and highest viscosity values belonged to the control sample and T9 treatment, respectively ($p < 0.01$). In kefir containing aloe vera and dill powder, the viscosity increased with increasing fiber content. Knowledge of viscosity values helps to determine the most appropriate formulation (Bayarri, Chuliá *et al*. 2010)Viscosity is affected by several factors such as constituents, especially the amount of fat and stabilizers, type and quality of components, concentration and temperature (Nagovska *et al*., 2018). Increasing the dry matter stabilizes the gel network and increases the bonding capacity with water. The results of previous research have shown that increasing the total solids of kefir increases the viscosity of the product as a result of increasing the consistency and flow index (Nagovska *et al*., 2018). In fact, the increase in viscosity is due to the binding of free water in the sample by added hydrocolloids (Dwiloka *et al*., 2020).

- ***Textrure***

The results of the study of the hardness of kefir samples are given in Figure 5. The addition of dill and aloe vera powders showed a significant effect on the maximum force (maximum force required to compress kefir samples during the first stage) the texture of kefir samples and there was a statistically significant difference between different samples.

- ***Color***

The results of the color evaluation of kefir samples showed that the type and amount of fiber are significant on the parameters L * (brightness), a * (green to red color spectrum), and b * (yellow to blue color spectrum) (Table 3).As can be seen from Table 3, as the amount of dill and aloe vera powders increased, the b * index increased and the L * and a * index decreased.The results of this study are in accordance with the reports of Dello Staffolo *et al*. (2004) who showed that

kefir treatments containing fiber had the lowest brightness. However, according to the results, by adding fiber to kefir, the parameter b * increased and by adding more percentages of fiber, a significant difference was observed(Staffolo *et al*., 2004).

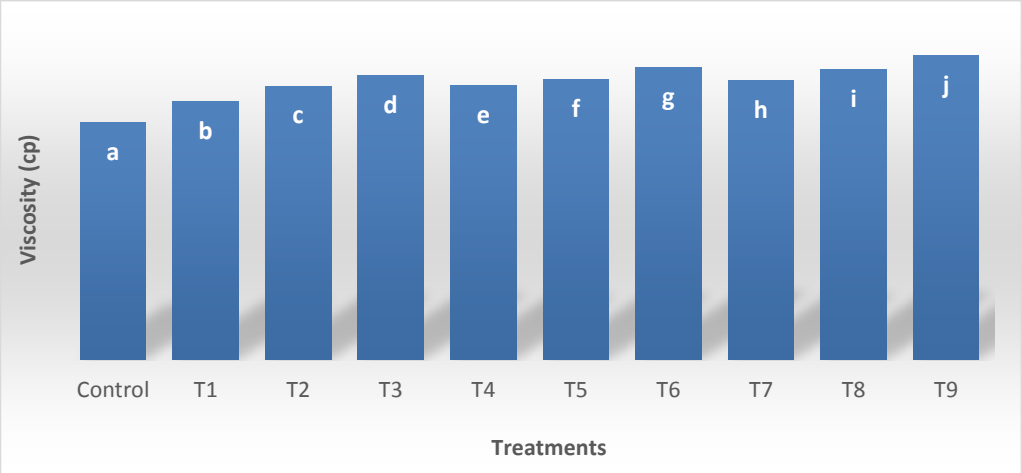


**Fig. 4.** Viscosity in kefir kefir samples containing different concentrations of dill and aloe vera.

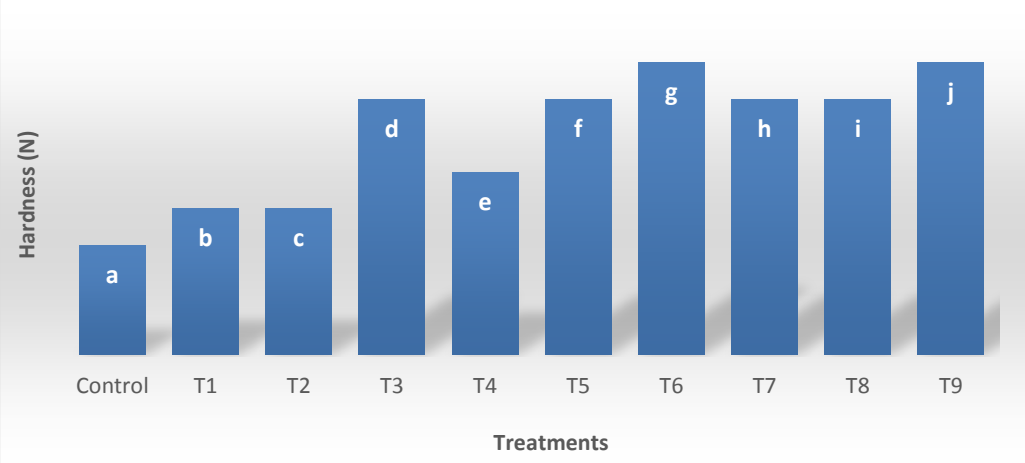


**Fig. 5.** Hardness in kefir kefir samples containing different concentrations of dill and aloe vera.

**Table 3.** Color analysis in kefir samples containing different concentrations of dill and aloe vera

| Treatments | L* | a* | b* |
|---|---|---|---|
| Control | $65.95\pm0.5^{a}$ | $1.67\pm0.05^{a}$ | $1.85\pm0.1^{a}$ |
| $T_1$ | $63.27\pm0.15^{b}$ | $0.91\pm0.07^{b}$ | $4.09\pm0.14^{b}$ |
| $T_2$ | $61.75\pm0.22^{c}$ | $0.79\pm0.11^{c}$ | $4.58\pm0.2^{c}$ |
| $T_3$ | $60.98\pm0.1^{d}$ | $0.63\pm0.05^{d}$ | $5.23\pm0.11^{d}$ |
| $T_4$ | $61.69\pm0.35^{e}$ | $0.77\pm0.09^{e}$ | $4.57\pm0.17^{e}$ |
| $T_5$ | $60.89\pm0.41^{f}$ | $0.62\pm0.12^{f}$ | $5.21\pm0.1^{f}$ |
| $T_6$ | $59.26\pm0.23^{g}$ | $0.56\pm0.15^{g}$ | $5.83\pm0.15^{g}$ |
| $T_7$ | $60.83\pm0.25^{h}$ | $0.61\pm0.1^{h}$ | $5.21\pm0.11^{f}$ |
| $T_8$ | $59.17\pm0.5^{i}$ | $0.54\pm0.07^{i}$ | $5.80\pm0.12^{h}$ |
| $T_9$ | $58.63\pm0.35^{j}$ | $0.47\pm0.09^{j}$ | $5.11\pm0.1^{i}$ |

Lowercase letters indicate differences between treatments at the 1% confidence level

- ***Sensory results***

Sensory properties are the main factors in accepting or rejecting many products and gaining satisfaction from their consumption. The results of statistical analysis showed that the increase in fiber content on the sensory properties of kefir samples was significant ($p < 0.01$). Comparison of odor results in Table 4 showed that increasing the amount of dill and aloe vera powders improved the odor in the final product, according to the panelists($p < 0.01$), which indicates the positive interaction of both powders simultaneously. Decreased scoring by panelists on samples containing high percentages of powder may be due to the fact that increasing the powder increases the viscosity and this slows down the movement of macromolecules in the complex molecular space. In terms of texture, the addition of dill and aloe vera powders reduced the desirability and acceptance of this property. Fernandez-Garcia *et al*. (2009) reported that increasing fiber to kefir improved kefir texture and consistency but decreased its sensory quality(Fernández- López *et al*., 2009) .Sendra *et al*. (2010) and Delvastafloo *et al*. (2004) showed that increasing Fiber reduces the sensory properties of kefir samples by the consumer (Staffolo *et al*. 2004; Sendra *et al*., 2010).

The addition of dill and aloe vera powders to kefir samples did not have a favorable effect according to the panelists and no statistically significant difference was observed between the control samples, T1, T2, and T4 in terms of color suitability. The highest and lowest color desirability were present in the control and T9 treatment, respectively. The results of this study showed that samples of kefir enriched with dill and aloe vera powders, despite the reduction in some sensory properties, had a high overall acceptance score and were in a good and acceptable range for panelsits. Gündoğdu *et al*. (2009) in the study of the effect of garlic on the sensory properties of stirred and molded kefir, observed that 0.1% of added garlic compared to 0.5%, a more desirable product in terms of evaluators to Has created (Gündoğdu *et al*., 2009).

## Conclusion

In this study, the effect of dill and aloe vera powder powders on the physical, chemical and sensory properties of diet kefir was investigated. For this purpose, dill and aloe vera powder were added to kefirs at three levels of 0.5, 0.75 and 1% each, and its physicochemical and sensory properties were measured. The results showed that the pH of all samples decreased with increasing fiber content, which is due to the growth of kefir-

**Table 4.** Sensory evalauation of kefir samples containing different concentrations of dill and aloe vera

| Treatments | Taste | Texture | Odor | Color | Overall acceptance |
|---|---|---|---|---|---|
| Control | $4.600\pm0.009^{a}$ | $4.575\pm0.009^{a}$ | $4.664\pm0.009^{a}$ | $4.652\pm0.012^{a}$ | $4.532\pm0.007^{a}$ |
| $T_1$ | $4.661\pm0.008^{b}$ | $4.568\pm0.009^{b}$ | $4.768\pm0.007^{b}$ | $4.648\pm0.009^{b}$ | $4.620\pm0.012^{b}$ |
| $T_2$ | $4.690\pm0.005^{c}$ | $4.456\pm0.012^{c}$ | $4.777\pm0.008^{c}$ | $4.643\pm0.012^{c}$ | $4.647\pm0.009^{c}$ |
| $T_3$ | $4.766\pm0.009^{d}$ | $4.376\pm0.005^{d}$ | $4.845\pm0.009^{d}$ | $4.590\pm0.009^{d}$ | $4.920\pm0.018^{d}$ |
| $T_4$ | $4.733\pm0.018^{e}$ | $4.460\pm0.018^{e}$ | $4.802\pm0.012^{e}$ | $4.638\pm0.008^{e}$ | $4.879\pm0.017^{e}$ |
| $T_5$ | $4.751\pm0.009^{f}$ | $4.361\pm0.017^{f}$ | $4.886\pm0.008^{f}$ | $4.531\pm0.018^{f}$ | $4.942\pm0.018^{f}$ |
| $T_6$ | $4.470\pm0.005^{g}$ | $4.277\pm0.018^{g}$ | $4.540\pm0.012^{g}$ | $4.433\pm0.017^{g}$ | $4.489\pm0.005^{g}$ |
| $T_7$ | $4.744\pm0.012^{h}$ | $4.367\pm0.009^{h}$ | $4.902\pm0.005^{h}$ | $4.512\pm0.005^{h}$ | $4.928\pm0.007^{h}$ |
| $T_8$ | $4.475\pm0.009^{i}$ | $4.289\pm0.007^{i}$ | $4.552\pm0.017^{i}$ | $4.430\pm0.012^{i}$ | $4.475\pm0.005^{i}$ |
| $T_9$ | $4.414\pm0.017^{j}$ | $4.160\pm0.012^{j}$ | $4.487\pm0.007^{j}$ | $4.375\pm0.007^{j}$ | $4.399\pm0.009^{j}$ |

initiating bacteria and the production of lactic acid by these bacteria. Also, with increasing the amount of fiber, the acidity of the samples increased significantly. The results of dry matter percentage showed that with increasing fiber content, kefir dry matter percentage increased. Also, the dry matter content of kefir samples increased due to water evaporation. increasing the concentration of dill and aloe vera powders lead to the syneresis decreased due to the replacement of the aqueous phase by fiber and the strength of the gel network. The results obtained from the evaluation of viscosity and texture showed that with increasing dill and aloe vera powders, the amount of these two parameters increased. The results obtained from the color evaluation of the samples showed that with increasing the amount of dill and aloe vera powders, index b* had an increasing trend, and the amount of index L* and a* decreased. The results of statistical analysis showed that the increase in fiber content on odor, taste, color, texture and overall acceptance of kefir samples was significant.In general, the results showed that the addition of dill and aloe vera powders to diet kefir improved the physical, chemical and sensory properties of kefir. The most desirable treatment was introduced by the evaluators of T7 treatment (1% dill powder + 0.5% aloe vera powder). Therefore, the use of dill and aloe vera powders to improve the properties of kefir is recommended.

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