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In Vitro Quality Test Of The Combination Of Kefir Milk Compound, Sweet Star Fruit Extract (Averrhoa Carambola L.) And Red Ginger

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ABSTRACT

Milk kefir is fermented milk produced by the activity of Lactic Acid Bacteria (LAB), yeast and acetic acid bacteria. Kefir milk contains many nutrients and properties, including immunomodulators, antibiotics, antioxidants and is rich in probiotics when compared to yogurt. Kefir milk from goats has more benefits than those from cow's milk, but it is still rarely in demand by the public because of its pungent aroma and taste. Star fruit is also known to have properties as an antibacterial, natural antioxidant and natural sucrose. Red ginger has also been widely recognized as a spice that has many properties as antibacterial, antioxidant, anti-inflammatory, and antiviral. In this study, researchers wanted to know the quality of the combination of Kefir milk with sweet star fruit juice and red ginger extract. The research will be carried out from February to May 2021. The kefir milk test includes bacteriological and physicochemical tests. The research design used a completely randomized design centered on one factor, namely the concentration of red ginger extract (0% control concentration, 4.5%, 6%, 7.5%). With Replica 3 times. Physicochemical tests are total acidity test, Vitamine c test and viscosity test. The results of the study showed that kefir fermented goat milk with the addition of star fruit juice and ginger juice was good for consumption, namely in treatment group 1 (containing 20% star fruit juice and 4.5% red ginger juice).

1. INTRODUCTION

In the era of the Covid-19 Pandemic, there have been many changes in conditions that must be felt by the people of Indonesia, such as anxiety, adaptation to new habits such as a healthy lifestyle implementing 3M (washing hands, keeping distance, wearing masks), as well as many activities at home. As an effort to maintain a healthy body during a pandemic, one of them is by consuming nutritious and balanced nutrition. Many natural ingredients in Indonesia have high nutritional value if they can be processed properly. One of them is Milk Kefir. Kefir milk is a fermented milk drink produced by the activity of Lactic Acid Bacteria (LAB), yeast and acetic acid bacteria (Farnworth ER, 2005).

Some raw materials for kefir milk can be made from cow's milk or goat's milk. The raw material for kefir derived from goat's milk is superior to cow's milk, because it has distinctive sensory characteristics such as the presence of goat's aroma which comes from short-chain fatty acids (Caponio, F., T. Gomes, V. Alloggio, 2000; Cais-Sokolińska , D., J. et.al, 2015). Kefir is a natural probiotic containing vitamins, minerals and essential amino acids that help in healing and maintaining body functions. Apart from that, it also contributes to immunomodulatory, antibacterial, antitumor, healing metabolic diseases, tuberculosis and digestive tract diseases (Otles, 2003; O'Brien, K. et.al, 2016). The weakness of kefir milk derived from goats is that there are not many fans because of the pungent aroma and less sweet taste.

Indonesia is a tropical country which is very fertile for growing fruit plants such as Belimbing. Several cities in Indonesia cultivate star fruit, including the city of Tulungagung, which is one of the

districts in East Java. Based on information from the article www.widyagama.ac.id, one of the most popular villages in the cultivation of star fruit is Moyoketen village, Boyolangu-Tulungagung sub-district. Some researchers point out the many benefits contained in star fruit including the presence of antioxidant and antibacterial activity. In general, star fruit is consumed in the form of fresh fruit, but can also be consumed in processed form. Star fruit can be processed into several food and beverage products, among the processed beverage products from star fruit are juices and fermented drinks. The amount of nutritional content in star fruit can be used as a prebiotic, nutrition for the normal flora in the body. If star fruit is mixed with kefir milk, it will add freshness, increase antioxidants and also make the sale value higher.

In addition, several spices are also being intensively researched related to their ability to boost the body's immune system, one of which is red ginger. The content of red ginger includes high antioxidant compounds, anti-inflammatory, anticancer and also antibacterial. So, researchers wanted to know the quality of the combination of kefir milk compounds with starfruit juice and red ginger extract in vitro (Wisudanti, 2017).

From the background above, the researcher wanted to know how the quality of the combination of kefir milk with Belimbing fruit juice and red ginger extract affects health? The aims of this study include wanting to provide information about the quality of the combination of kefir milk with starfruit juice and red ginger extract bacteriologically, physicochemically, and its uses in the health sector.

2. METHOD

This study was a true-experimental study using a complete randomized factor, namely starfruit juice (0% concentration (control), 20%) and red ginger extract ((0% control), 4.5%, 6%, 7.5%). The experiment will be replicated 3 times.

This research was carried out from May to September 2021 at the Chemistry Laboratory of STIKes Kartrasa Tulungagung. The tools needed for this research are: petri dish, beaker glass, stir bar, aluminum foil, filter paper, jar, oven, incubator, spirit lamp, measuring flask, Erlenmeyer, balance, electric/gas stove, magnetic stirrer, pH, rotator, centrifuge, viscometer. Meanwhile, the materials needed are Etawa goat milk from goat breeders in Pakel-Tulungagung Village, Belimbing fruit from Belimbing Tourism Moyoketen-Tulungagung, red ginger, starter, skimmed milk, distilled water, ethanol, NaOH, HCL, 0.9% NaCL, KI, Amylum, KIO3, H2C2O4, methylene blue, Gram paint.

pH test

The pH value is used to measure acid or alkaline levels, and acts as a control for several pharmaceutical, cosmetic and food products (Hendri Wasito, et al, 2017). The pH value in this study will be used to measure and compare samples from fermented milk. According to several studies, fermented milk caused by the activity of specific microorganisms is characterized by a decrease in pH value compared to before it was fermented (MAL, 2015).

Total Acid Test and Vitamin C Test

Analysis of acid-base levels using alkaline and vitamin C methods was carried out based on the titration method. The sample used was 1 gram/ml then diluted with distilled water. Then titrate using the solution with certain indicators. The end point of the titration is marked by the formation of a stable pink color in the total acid test and prussian blue in the vitamin C test (Kamaluddin, 2018).

Viscosity Test with Viscometer Stormer

Viscosity is also called the level of thickness of a liquid (Tissos, N.P., Yulkifli., Dictionary, 2014). In this study, researchers used a Stormer viscometer (Rion VT-04). The viscometer is able to form a space between the bowl and the rotor, then wait until it reaches temperature equilibrium. Installing the load on the hanger, then recording the time on the rotor to reach 100 rotations. The results of this data are converted into rpm form, do it repeatedly. (Sinko, 2013; Wakhidah, N., 2017).

3. RESULTS AND DISCUSSION

pH test

Based on pH measurements using pH indicator strips, all samples including the control showed a pH value of 4. According to the national standards agency (BSN) (National Standardization Agency (BSN), 2009) that the pH level in kefir products is around 4.2-4.6 as measured by a pH meter [15], whereas in this study only used pH strips so it was not so be thorough in decimal. The results of fermented milk, both without treatment and with treatment, showed a decrease in the same pH value, which was 4 compared to the pH value in the milk before it was fermented (in the preliminary test), which was 6. Furthermore, the total acid test was carried out on all samples.

Total Acid test results

Table 1. Average Of Total Acid Test Result

GROUP	R1	R2	R3	MEAN ± STDEV
K	28,5	29	29	28,83 ± 0,2357
P1	23	23	23,5	23,17 ± 0.2357
P3	21	21,7	21,5	21,4 ± 0,2944

Table 1. shows the yield of total acid in kefir milk decreased with increasing concentration of starfruit juice and variations in concentration of ginger juice. The highest total acid level was in the control group where there was no addition of star fruit juice or ginger juice. Meanwhile, the lowest total origin content was in treatment group 3, namely kefir milk with the addition of 20% starfruit juice and 7.5% ginger juice.

Figure 1. Graph of average total acid test results in the control group (K), treatment 1 (P1), treatment 2 (P2), and treatment 3 (P3).

The total acid test results are in accordance with the results of research by Maya Narita, 2016, namely the low total acid produced may be due to the inhibition of the log phase on the growth curve of lactic acid bacteria so that organic acids have not been formed optimally during the fermentation period of the kefir product. In this study, it was suspected that apart from not being optimally formed, it could be due to the addition of ginger extract concentration, in accordance with Wakhidah's statement, 2017, in his research results also showed that ginger pulp extract in yogurt reduced total acid levels (Wakhidah, N., 2017). The higher the concentration of ginger extract, the lower the total acid level in yogurt (kefir milk, in this study). The highest total acid level in the treatment sample was in treatment group 1 (4.5% ginger extract). The results data have been tested for normality using the Shapiro Wilk SPSS. It is known that the value of $p = 0.6$, so it is not so significant because $p > 0.05$. In addition, the average total acid content in the above results is 0.2% according to the BSN that the total acid content of kefir milk is around 0.2% -0.6% (National Standardization Agency (BSN), 2009; Codex Alimentarius Committee, 2003).

Vitamin C Test Results

Table 2. Vitamin C Test Results

GROUP	R1	R2	R3	MEAN ± STDEV
K	10	10,1	10,2	10,10 ± 0,0816
P1	10,5	10,8	10,5	10,6 ± 0,1414
P2	10,8	10,5	10	10,43 ± 0,3299
P3	10	10,5	10,5	10,33 ± 0,2357

Based on table 2 it is known that the highest levels of vitamin C are in the treatment group 1 and the lowest levels of vitamin C are in the control group. It is assumed that in the control group there is no addition of starfruit juice while in the control group it will increase due to the addition of vitamin C from starfruit juice.

Figure 2. Graph of average Vitamin C test result in the control group (K), treatment 1 (P1), treatment 2 (P2), and treatment 3 (P3).

In accordance with Kukuh Sutedjo's research, 2015, in his research the addition of star fruit juice in kefir milk will increase vitamin C levels (Sutedjo, K.S.D & Nisa, 2015). However, in this study, the treatment group was also added with alkaline ginger extract so that the higher the ginger extract content, the lower the acidic vitamin C level.

Viscosity Test with Viscometer Stormer

Table 3. Average Viscosity Test Results

GROUP	UNIT (cP)
K	100
P1	100
P2	100
P3	100

From table 3, it is known that the value indicated by the Viscometer Stormer in all groups of kefir milk samples is the same, namely 100 cP. The value is seen from the numbers shown by the tool.

The value of the viscosity measurement results in this study is in accordance with the BSN which states that for the viscosity of kefir fermented milk tends to be liquid, the viscosity value is 117.50-451.25 cP. In this study, the decimal number was not clearly visible and only saw the number shown on the tool. So, it is necessary to conduct high-level research to be able to analyze the viscosity of kefir milk. In this study it was found that the addition of ingredients such as starfruit juice and ginger extract did not affect the viscosity of kefir milk. According to Rup Mal (2013) Kefir grains contain lactic acid bacteria and yeast which can increase the viscosity of products that produce exopolysaccharide. The results of several studies also state that differences in duration and addition of ingredients affect the level of viscosity of kefir milk (MAL, 2015), so a review is necessary in this study.

4. CONCLUSION

The results of the research on the quality test of fermented goat's milk with the addition of starfruit juice and ginger extract were obtained as follows: Physically: there was no significant difference in the thickness of kefir milk that received the addition of starfruit juice and ginger juice compared to those that did not get the addition, the pH level of kefir milk already optimal according to BSN, namely 4, total kefir milk acid according to BSN, namely 0.2%, vitamin C levels increased in the treatment group compared to the control group. Concentration affects the decrease in vitamin C and total acid levels. High levels of total acid and vitamin C were found in treatment group 1 (Ginger extract 4.5%). So that researchers can conclude that fermented goat milk with the addition of starfruit juice and ginger juice is good for consumption, namely in treatment group 1 (containing 20% starfruit juice and 4.5% red ginger juice).

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REFERENCES

[1] Badan Standardisasi Nasional (BSN) (2009) 'Minuman susu fermentasi berperisa', in. SNI 7552:2009.
[2] Cais-Sokolińska, D., J. Wójtowski, J. Pikul, R. Danków, M. Majcher, J. Teichert, and E. B. (2015) 'Formation of volatile compounds in kefir made of goat and sheep milk with high polyunsaturated fatty acid content', *J. Dairy Sci.*, 98, pp. 6692–6705.
[3] Caponio, F., T. Gomes, V. Alloggio, and A. P. (2000) 'An effort to improve the organoleptic properties of a soft cheesefrom rustic goat milk', *Food Res. Technol*, 211, pp. 305–309.
[4] Codex Alimentarius Committee (2003) *Codex Standard for Fermented Milks. Food and Agriculture Organization*.
[5] Farnworth ER (2005) 'Kefir-a Complex Probiotic', *Food Science and Technology Bulletin*.
[6] Hendri Wasito , Eva Karyati , Charlina Detty Vikarosa , Ilmi Nur Hafizah , Hamidah Raisa Utami, M. K. (2017) 'Test Strip Pengukur pH dari Bahan Alam yang Diimobiisasi dalam Kertas Selulosa', *Indonesian Journal of Chemical Science*, 6, p. 3.
[7] I Putu Esa Pradana, Sri Sinto Dewi, W. W. (2014) 'Aktivitas Kefir dan Isolat Bakteri Asam Laktat dari Kefir dalam Menghambat Pertumbuhan Salmonella typhi', in *UNIMUS: D4 Analis Kesehatan.Prosiding Seminar Nasional Mahasiswa Unimus*. SEMARANG: e-ISSN: 2654-766X, p. Vol.1.
[8] Kamaluddin, M. J. N. (2018) 'Pengaruh Perbedaan Jenis Hidrokoloid Terhadap Karakteristik Fruit Leather Pepaya', *Fakultas Pendidikan Teknologi dan Kejuruan: Universitas Pendidikan Indonesia. Jurnal Edufortech*, 3, p. 1.
[9] Kuswiyanto (2016) *Bakteriologi 1: Buku Ajar Analis Kesehatan*. Penerbit.EGC.ISBN.
[10] MAL, R. (2015) 'Effect Of Storage Duration In Refrigerator Temperature On Ph Value, Viscosity, Total Lactic Acid And Profiles Protein Dissolved Of Goat Milk Kefiri', *Universitas Brawijaya: Fakultas Peternakan. Journal of Brawijaya.*
[11] O'Brien, K. V., K. J. Aryana, W. Prinyawiwatkul, K. M. C. Ordonez, and C. A. B. (2016) 'Short communication: The effects of frozen storage on the survival of probiotic microorganisms found in traditionally and commercially manufactured kefir', *J. Dairy. Sci*, 99, pp. 7043–7048.
[12] Otles, S. and O. C. (2003) 'Kefir: A probiotic dairy-composition, nutritional and therapeutic aspects', *Pakistan J. Nutr*, 2, pp. 54–59.
[13] S. A. Lindawati, N. L. P. Sriyani, M. Hartawan, I. G. S. (2015) 'Study Mikrobiologis Kefir Dengan Waktu Simpan Berbeda', *Universitas Udayana: Fakultas Peternakan.* doi: ISSN : 0853-8999.
[14] Sinko, P. (2013) *Farmasi Fisika dan Ilmu Farmasetika*. 5th edn. JAKARTA: Penerbit Buku Kedokteran EGC.
[15] Sutedjo, K.S.D & Nisa, F. C. (2015) 'Konsentrasi Sari Buah Belimbing (Averrhoa carambola) Dan Lama Fermentasi Terhadap Karakteristik Fisiko-Kimia Dan Mikrobiologi Yoghurt', *UB:*

Teknologi Pertanian.Jurnal Pangan dan Agroindustri, 3, p. 2.

[16] Tissos, N.P., Yulkifli., Kamus, Z. (2014) 'Pembuatan Sistem Pengukuran Viskositas Fluida Secara Digital Menggunakan Sensor Efek Hall UGN3503 Berbasis Arduino Uno328', *FMIPA: Universitas Negeri Padang. Jurnal Sainstek*, VI, pp. 71–83.

[17] Wakhidah, N. (2017) 'Yoghurt Susu Sapi Segar dengan Penambahan Ekstrak Ampas Jahe dariDestilasi Minyak Atsiri', *Fakultas Pertanian. Proceeding Biology Education Conference*, 14, pp. 278–284.

[18] Wisudanti, D. . (2017) 'Efek Kefir terhadap Respons Imun Sukarelawan Sehat Secara in vitro', *Journal of Agromedicine and Medical Sains*, 3, p. 2.