

Preparation and characterisation of active component in nabeez water of ajwa dates (*Phoenix dactylifera* L.) mixed in healthy brown rice milk (BRM) as halal beverage

Preparasi dan karakterisasi komponen aktif air nabeez kurma ajwa (Phoenix dactylifera L.) dalam susu beras merah sehat sebagai minuman halal

Rais Nur Latifah^{*1} dan Sri Rahmania²

¹ Fakultas Sains dan Teknologi, Universitas Islam Negeri Walisongo Semarang
Jalan Prof. Dr. Hamka Km. 1, Semarang, Indonesia

² Fakultas Sains dan Teknologi, Universitas Islam Negeri Walisongo Semarang
Jalan Prof. Dr. Hamka Km. 1, Semarang, Indonesia

* e-mail: rais.nurlatifah@walisongo.ac.id



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ABSTRACT

Nabeez water or dates infused water is the Prophet Muhammad's favourite drinks. Flavonoids, phenols, alkaloids, and beta D-glucan in dates have anticancer and antitumor activity. This study aims to prepare and characterise the active component of nabeez water made with ajwa dates, applied in BRM (Brown Rice Milk) products. BRM is an innovative plant-based beverage made with brown rice and nabeez water from ajwa dates as a halal beverage for immune booster in the era of the covid-19 pandemic. The methods to analysis the products are the preparation of nabeez water, the pasteurisation method for halal drinks with the LTLT (Low-Temperature Long Time) method, toxicity testing, pyrochemical testing, functional group analysis using FTIR instrument, milk dye degradation analysis and stability test. The results showed phenolic, flavonoids, catechol tannins, saponins, alkaloids, Mayer's test, and Wagner's test in halal drinks but not shown the tannin of gallate, anthraquinone, steroid test, and triterpenoid test. The toxicity test using the Brine Shrimp Lethality Test (BSLT) method of the LC₅₀ value showed the Concentration 50 (LC₅₀) value is 721.56 ppm. Analysis of functional groups using FTIR showed absorption of functional groups such as OH (hydroxide), C=O, C=C, C=CH, and Ar-H.

ABSTRAK

Kata kunci:

kurma ajwa (*Phoenix dactylifera* L.);
minuman halal;
air nabeez

Air nabeez atau infused water kurma merupakan minuman kegemaran Rasulullah SAW. Kandungan flavonoid, fenol, alkaloid, dan beta D-glukan pada buah kurma memiliki aktivitas antikanker dan antitumor. Penelitian ini bertujuan untuk melakukan preparasi dan karakterisasi kurma ajwa menjadi air nabeez yang diaplikasikan dalam produk SBK (Susu Beras Kurma). SBK merupakan inovasi minuman berbahan dasar beras merah dengan air nabeez kurma ajwa sebagai minuman halal dan bermanfaat sebagai imun booster di era pandemi covid-19. Metode penelitian untuk menganalisis produk minuman halal berbahan dasar air nabeez kurma ajwa yaitu penyiapan air nabeez kurma ajwa, metode pasteurisasi minuman dengan metode LTLT (Low Temperature Long Time), pengujian toksisitas, pengujian firokimia, analisis gugus fungsi menggunakan instrument FTIR, analisis degradasi zat warna susu dan uji kestabilan minuman. Hasil penelitian menunjukkan produk minuman mengandung senyawa fenolid, flavonoid, tannin katekol, saponin, alkaloid, uji mayer dan uji wagner namun tidak menunjukkan adanya kandungan tannin galat, antrakuinon, uji steroid dan uji triterpenoid. Hasil uji toksisitas dengan metode Brine Shrimp Lethality Test (BSLT) nilai LC₅₀ menunjukkan nilai Concentration 50 (LC₅₀) adalah 721,56 ppm. Analisis gugus fungsi dengan menggunakan FTIR pada air nabeez kurma ajwa dalam minuman halal drink yaitu adanya serapan gugus fungsi OH (hidroksida), C=O, C=C, C=C-H bending dan Ar-H.

1. Introduction

Water is the source of life for living things. Humans need water at a minimum of 2.5 L every day to maintain a healthy body (Mawardi, 2014). The rest, demand of water for each person is different according to the activity and condition of the body. The reason is the more water is released, then the more water is consumed by a person. Water in the human body can be excreted through breathing, urine, faeces, and sweat (Sari, 2014).

The water content in the human body is about 65% or 47% for adults. That is why humans need water. Water is a source of life for humans. Allah SWT said in Surah Al-Anbiya verse 30, which the meaning "Do the disbelievers not see that the heavens and the earth were one mass, and We tore them apart? And We made from water every living thing. Will they not believe?".

Water has varieties function for the body. In addition, to preventing dehydration, water also regulates temperature of body and cell formation as a solvent and lubricant (Sari, 2014). However, not everyone likes to drink water. Some people prefer various water that has tastes such as tea, juice, coffee, bottled drinks, or carbonated drinks. The habit of consuming packaged drinks for a long time is not good for the health since packaged drinks usually contain preservatives, artificial sweeteners, or other synthetic chemicals that are harmful while accumulated in the body.

Infused water is mineral water added with pieces of fruit or herbal plants that set aside for a particular time until the fruit juice is extracted (Abdillah et al., 2017). By adding fruit and herbal plants, the mineral water will flavoured and have more benefits (Munir and Munir, 2020). One of fruit that can be used as infused water is dates (Al Jaouni et al., 2019). The drink made from soaking dates in Islam is known as nabeez water.

Date-palm is one of the traditional medicinal plant with many benefits and is considered as a reliable source of herbal medicine, including the fruit. It is acknowledged to manage several diseases (Ali et al., 2020). For Muslims, dates are one of fruit that is not unfamiliar because it has been written in the Qur'an and Al-Hadith many times. Therefore, dates unavoidably have much nutritional content and have many health benefits. Various nutritional content in dates includes water, carbohydrates, fatty acids, protein, amino acids, fibre, pectin, and many more (Sheikh et al., 2014). Fatty acids in dates contain saturated fatty acids such as capric, lauric, myristic, palmitic, stearic, margaric, arachidic, heneicosanoic, behenic, and tricosanoic acids, as well as unsaturated fatty acids such as palmitoleic, oleic, linoleic, and linolenic (Mohammed et al., 2018).

Dates are also the fruit with the highest protein content that is about 2.3-5.6% if compared to the protein content of apples (0.3%), oranges (0.7%), bananas (1%), and grapes (1 %) (Mallhi et al., 2014). In addition, dates also contain 23 amino acids in their protein, including aspartic acid, threonine, serine, glutamic acid, proline, glycine, and alanine (Zhang et al., 2013). The most abundant amino acid content is found in dates at the halal ripeness level (Triastari Armanda, 2015). Several studies have also stated that dates contain fibre, which is

good for health, such as lowering cholesterol in the body. The pectin content in dates is 0.5-3.9% (Ahmad et al., 2021). Pectin has the function of reducing the risk of metabolic diseases caused by heart disorders and diabetes (Aljuhani et al., 2019).

Chronic diseases such as diabetes type 2 can be prevented by adjusting to a healthy diet such as by consuming brown rice rather than white rice. Brown rice is more nutritious and has a lower glycaemic index than white rice. But because of the taste, encouraging people to eat brown rice becomes more challenging (Varshini et al., 2013). Brown rice contain carbohydrate, alkaloid, glycoside, phenolic compounds, tannin, saponin, flavonoid, protein and amino acid, and has therapeutic ability (Krishnaveni and Dhanalakshmi, 2014). Therefore, brown rice milk (BRM) as a plant-based non-dairy product can be an alternative beverage to optimise the benefit of brown rice (Kittibunchakul et al., 2021).

Good food and beverages contain good nutrients for health. When they were consumed, not cause harmful side effects or are harmful to the body is one of the basis terms to call as Halal to eat and drink (Nafis, 2019). Halal is derived from the Arabic word "Halla," meaning "to be lawful, legitimate or not prohibited." Al Qur'an explains halal rules not only for food but for drinks that the content or the ingredients of food or drinks product must comply with Islamic diet laws (Sukati and Bawaain, 2019). Furthermore, Halal should be judged by the process, such as making the product, produced, manufactured, and stored according to Islamic law (Cruz and Billanes, 2021).

This study aims to prepare and characterise the active component of nabeez water from ajwa dates mixed in BRM (Brown Rice Milk) products. BRM is an innovative plant-based beverage made from brown rice mixed with nabeez water of ajwa dates as a halal beverage. This halal beverage is a drinks innovation as an immune booster in the era of the covid-19 pandemic.

2. Methods

2.1. Production of BRM (Brown Rice Milk) mix with nabeez water of ajwa dates (*Phoenix dactylifera* L.)

Ajwa dates are the essential ingredients used in this study. Ajwa dates were got from dates shops in Indonesia. Ajwa dates were selected based on the texture that was still fresh, not rotten, brown, and oval. Dates were washed before being used and then weighed for the maceration process. Fruits and seeds were the part of the ajwa dates that were used in this study. The maceration process was conducted by soaking the dates in distilled water.

BRM was produced by LTLT (*Low-Temperature Long Time*) Pasteurisation. The milk was placed in a sterilised glass bottle. The bottles were put into a pasteurisation pan. The pasteurisation process was conducted at a temperature of 62- 65°C for 0.5-1 hour. Then the sample was placed in a water bath for the cooling process to reach a temperature of 26-30°C. Pasteurisation of halal beverage was repeated three times.

2.2. Phytochemical test of nabeez water of ajwa dates in halal beverage

Phytochemical test was test to identify total tannin, steroid test, terpenoid test, flavonoid test that could be done by using the Shinoda test method, anthraquinone test, phenolic test, saponin test, and alkaloid test. Toxicity testing was conducted using the Brine Shrimp Lethality Test (BSLT) method using *Artemia salina* Leach larvae as test animals. This method follows the McLaughlin procedure with some modifications. The initial preparation was done by hatching shrimp larvae. Vessels for incubating shrimp larvae were provided with bulkhead. Seawater was made by dissolving salt with distilled water at a concentration of 10%. One chamber in the vessel was equipped with a lamp to warm the larvae after hatching, while 50 mg of *Artemia salina* Leach shrimp eggs were added and then covered with aluminium foil in another. Hatching time lasted for 48 hours in water that has a constant oxygen content.

A trial or orientation test needs to be done in this toxicity test. It was necessary to make it easier to determine the most effective concentration of dates extract to kill shrimp larvae. An orientation test was conducted with 5 mL of artificial seawater containing ten shrimp larvae was pipetted and put into a test tube. 5 mL of sample solution with concentrations of 1000 ppm, 3000 ppm, 5000 ppm, 7000 ppm, and 9000 ppm that had been extracted with distilled water were put into each test tube containing shrimp larvae. A control test tube was also required without adding a sample. The solution was shaken slowly until homogeneous, then were put aside for 24 hours at room temperature. After 24 hours, the number of dead and live larvae was observed. The experiment was repeated three times. The number of live and dead larvae was calculated by adding up the result of all the tubes at the same concentration. Calculation of mortality from shrimp larvae using equation (1):

$$\text{Mortality} = \frac{\text{amount of dead larvae}}{\text{total of live and dead larvae}} \times 100\% \quad (1)$$

2.3. FTIR test

The characteristic test of nabeez water of ajwa dates can be conducted using the FTIR instrument to determine the functional groups. Sample preparation for this characterisation test can be done by mashing and then drying ajwa dates in an oven at a temperature of 50°C for 24 hours.

2.4. Analysis of BRM shelf life as halal beverage

BRM samples that had been pasteurised and packed in 10 mL vials were measured the pH values on day 0 to day 30th using pH meter. pH meter was calibrated using buffer solution of pH 4, 7 and 10.

2.5. Determination of the kinetics of dye degradation reaction of nabeez water of ajwa dates in halal beverage

1 mL of the sample was put into a 2 mL micro tube. Then 1 mL of chloroform was added and stirred using a

vortex. The sample was centrifuged at 12.000 rpm for 30 minutes so that it would separate into two phases. The upper phase was then decanted, and absorbance measurements were taken at $\lambda = 241$ nm based on the scanned maximum wavelength in the 200–400 nm range.

2.6. Kinetic Analysis of Water Stability In Nabeez Water of Ajwa dates in Halal Beverage.

1 mL of the sample was put into a measuring flask. Then added distilled water to 10 mL and measured the transmittance at a wavelength of 656 nm. Then, converted the transmittance result into a turbidity value with an equation as shown in equation (2).

$$A = -\log(\%T) \quad (2)$$

Where A is Absorbance at a wavelength of 656 nm, and T is the transmitter.

3. Result and discussion

3.1. Production of BRM (Brown Rice Milk) mixed with nabeez water of ajwa dates (*Phoenix dactylifera* L.)

Brown rice milk (BRM) in this study was conducted by varying the composition of brown rice, nabeez water of ajwa dates, and water in the BRM with nabeez water of ajwa dates production process. Variations in composition are 1:10 and 1:35. BRM with nabeez water of ajwa dates was produced through a pasteurisation process using the LTLT (Low-Temperature Long Time) method. Making a mixture of BRM with nabeez water of ajwa dates was produced with a stirrer speed of 200 rpm, so that high interaction and collision occurred between the dispersed and dispersing phases. While, the kinetic energy that was produced is high along with the speed of the collision that occurs. The temperature for making the BRM with nabeez water of ajwa dates used is 80–90°C, which will affect the brown motion produced, which is higher and faster. So that the producing milk was homogeneous and stable.

Physical testing shows that BRM with nabeez water of ajwa dates type I and II have the same brown colour, smooth texture, and thick texture. The colour was produced from anthocyanin pigments from brown rice and ajwa dates. The anthocyanin pigment from brown rice produces red, while from nabeez water of ajwa dates produced brown. So It affected the milk products that were produced.

3.2. Phytochemical analysis of nabeez water of ajwa dates (*Phoenix dactylifera* L.)

Nabeez water of ajwa dates was prepared by soaking 30 grams of dates in 100 mL of distilled water. The time used for the immersion process is 12 hours, 36 hours, and 60 hours. Then nabeez water of ajwa dates were conducted to phytochemical test to determine the content of secondary metabolites.

Based on the soaking time conducted on ajwa dates from 12 hours, 36 hours and 60 hours, the results of phytochemical testing were similar. Positive results were shown in testing of phenolic, flavonoids, catechol

tannins, saponins, alkaloids, Mayer's test, and Wagner's test. In contrast, the negative results were shown in the tannin test, anthraquinone, steroid test, and triterpenoid test. Phytochemical testing showed the triterpenoid showed yellow in the resulting solution (Albab et al., 2020). The changes of colour occur because of the oxidation of terpenoid or steroid group compounds through the formation of conjugated double bonds. The formation of double bonds is also accompanied by releasing hydrogen, which brownish will appear in the sample (Mardiana and Apriyanti, 2021). Flavonoids will react with FeCl_3 to form purple. Flavonoids are included in the group of phenolic that have many -OH groups. Phytochemical tests using FeCl_3 could show phenol

groups. The presence of phenolic means the possibility of tannins' presence because tannins are polyphenolic (Sheikh et al., 2014). The formation of a blackish-green after FeCl_3 addition means the phenolic in samples will form complex compounds with Fe^{3+} ions.

Nabees water of ajwa dates was also prepared for toxicity tests. The sample used nabees water of ajwa dates during soaking time in 36 hours. It is the most effective time to make the most effective nabees water of ajwa dates. A toxicity test was conducted on larvae and the result was calculated with mortality formula in equation (1). The results of the toxicity and the orientation test that conducted to nabees water of ajwa dates were shown in table 1.

Table 1.
Orientation test result and toxicity test results against larvae

No.	Concentration (ppm)	Number of live larvae	Number of dead larvae	Concentration Log (x)	Probit (y)	LC ₅₀ (ppm)
1	0	0	0	0 (control)		
2	500	12	18	2.47	3.67	
3	700	11	19	2.84	4.29	
4	1200	10	20	3.21	4.58	721.56
5	1500	0	30	3.47	5.17	
6	1700	0	30	3.79	6.28	
7	1900	0	30	3.82	7.69	

The orientation test is an initial test before the toxicity test was conducted on the sample of nabees water. A toxicity test was conducted on the larvae to determine the effectiveness of nabees water. The toxicity test was conducted by using the Brine Shrimp Lethality Test (BSLT) method and calculating the LC₅₀ value. The LC₅₀ value shows the concentration that causes the death of as much as 50% in shrimp larvae. Toxicity test of ajwa dates fruit using the BSLT method got a lethality Concentration 50 (LC₅₀) of 721.56 ppm, which shows the concentration of ajwa dates extract could kill 50% of the total *Artemia salina* shrimp larvae. This toxicity value shows that the methanol extract of ajwa dates is toxic. Extracts containing toxic compounds (within the range of toxicity showing very toxic properties) to *salina* shrimp larvae are biological activity. The test is often used for the initial screening of bioactive compounds that have antitumor or anticancer potential.

3.3. Functional groups analysis of nabees water of ajwa dates

Analysis of functional groups in nabees water of ajwa dates used the FTIR (Fourier Transform Infra-Red) spectrum. Ajwa dates were analysed using seeds and the flesh and had to prepare before conducting to the test. The flesh of ajwa dates was conducted by the process of absorbing the water content in the fruit and storing it in a desiccator. While the date seeds were dried. Then, the date seeds were treated in a rotary evaporator and stored in a desiccator.

Dates flesh contains nutrients such as protein, carbohydrates, sugar, fibre, vitamin and mineral. The

nutrients were needed for making this healthy milk made from brown rice. The date seeds were also prepared and added to the milk to increase the antioxidant of nabees water of ajwa dates. Analysis result of the functional groups in date seeds and flesh were showed in Figure 1.

The FTIR spectra resulting from date seeds were analysed for their functional groups. At 3376.11 cm^{-1} , the OH group (hydroxide) absorbs, which has a broad spectrum. In the wavenumber region $2850\text{--}300\text{ cm}^{-1}$, there is a stretching CH absorption. In dates seed, the uptake of CH, a functional group of alkanes, is in 2928.35 cm^{-1} . The wavenumber region, $1900\text{--}1650\text{ cm}^{-1}$ C=O, is a typical absorption peak of ketone compounds. In date seeds, the absorption area is at a wavenumber of 1732.83 cm^{-1} . Then, between wavenumber of $1675\text{--}1500\text{ cm}^{-1}$, there is a typical absorption of the C=C functional group, an aromatic group. In date seeds, the area at a wavenumber of 1628.35 cm^{-1} is the typical absorption of the benzene ring. The wavenumber region of $1475\text{--}1300\text{ cm}^{-1}$ is a typical absorption region of CH bending. In the date seeds, the absorption area of this alkane is at a wavenumber of 1414.17 cm^{-1} . Then, in the wavenumber region $1000\text{--}650$, there was a typical absorption of C=CH bending and Ar-H, a side chain of the aromatic ring.

The dates flesh as the basic ingredient used in the manufacture of nabees water of ajwa dates was characterised first before nabees water ajwa dates were made. The date flesh was also analysed for functional groups that are the trait of ajwa dates. The analysis result of the functional groups of the dates flesh were shown in Figure 1b.

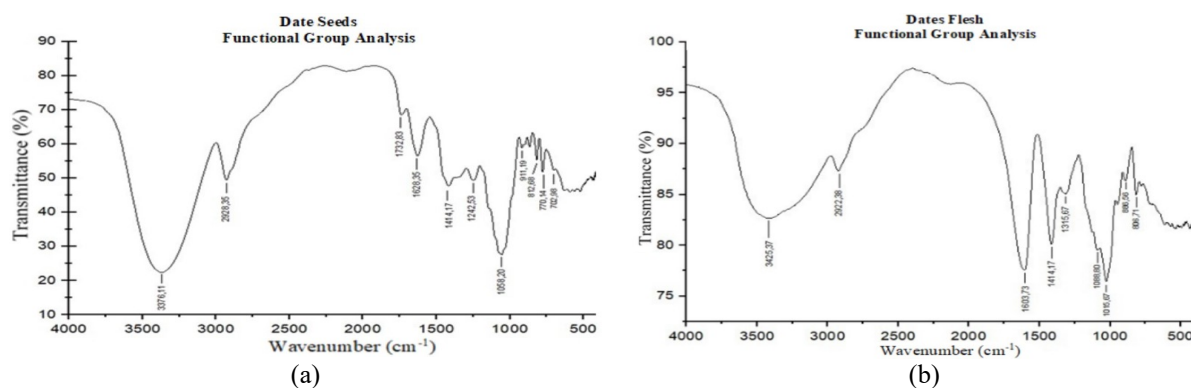


Figure 1. FTIR results: (a) date seeds, and (b) dates flesh

The results of the FTIR spectra of date flesh were analysed for their functional groups. At 3425.37 cm^{-1} , there was an absorption of the OH group (hydroxide) with broad-spectrum. In the wavenumber region $2850\text{--}300\text{ cm}^{-1}$, there was a stretching CH absorption. The uptake of CH in the date seed as a functional group of alkanes is in 2822.36 cm^{-1} . The wavenumber region, $1900\text{--}1650\text{ cm}^{-1}$ C=O, has a typical absorption peak of ketone. While in the dates, the absorption area was at a wavenumber of 1603.73 cm^{-1} . Then, between wavenumbers $1675\text{--}1500\text{ cm}^{-1}$, there is a typical absorption of the C=C functional group, an aromatic group. In the dates flesh, the area is at a wavenumber of 1603.73 cm^{-1} , which is the typical absorption of the benzene ring in the chemical structure of the date seed. The wavenumber region of $1475\text{--}1300\text{ cm}^{-1}$ is a typical absorption region of CH bending (Abdillah et al., 2017). In the dates flesh, the absorption area of this alkane is at a wavenumber of 1414.17 cm^{-1} . Then, in the

wavenumber region $1000\text{--}650$, there is a typical absorption of C=CH bending and Ar-H, a side chain of the aromatic ring. Ajwa dates seeds and flesh were conducted to make nabeez water of ajwa dates by soaking the dates for about 6-12 hours to get maximum results in the acquisition of nabeez water.

3.4. Analysis of BRM with nabeez water of ajwa dates shelf life as halal beverage

BRM with nabeez water of ajwa dates shelf-life was analysed when the milk reaches the consumer and when it is still in the hands of the producer. Milk samples were pasteurised using the LTLT (Low-Temperature Long Time) method at a temperature of $83\text{--}95^{\circ}\text{C}$. The pasteurisation process was repeated three times to get optimal results. Comparison of the milk shelf life type I and II on consumer and producer side were shown in Figure 2.

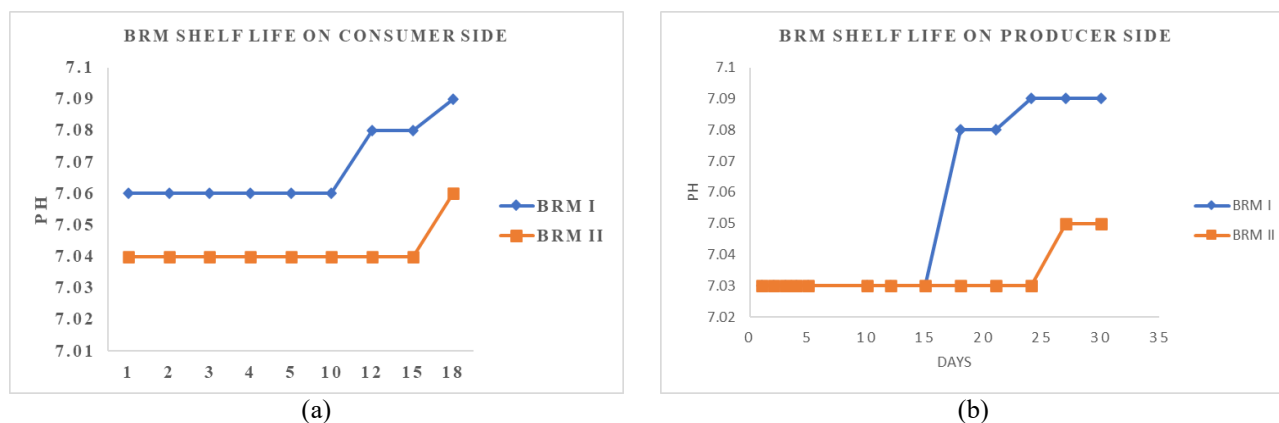


Figure 2. BRM shelf life: (a) the consumer side, and (b) the producer side

On the consumer side, BRM with nabeez water of ajwa dates type II had a longer shelf life than type I. The type II has a shelf life of 15 days with a pH of 7.02. Then, until the 30th day, the pH rises to a pH of 7.03. This pH range is still safe for consumption by the public because the difference of pH is not too significant. Meanwhile, BRM with nabeez water of ajwa dates type II has a shelf life of 10 days at pH 7.03 and has increased in pH from day to day until the 30th day at pH 7.04.

The analysis of the milk shelf life on the producer's side had a longer shelf life for 24 days with a pH range of 7.01, and its pH stability was still maintained until the 30th day. While on the producer's side, the shelf life of

milk type II had a shorter shelf life, which is up to the 15th day at the pH point of 7.02 and increases to pH 7.06 on the 30th day. The difference in pH is because of the storage conducted on the two different samples, specifically at a temperature of 4°C and at room temperature, 25°C . Besides, on the consumer side, the pH decreased because of the distribution process of milk from storage temperature to room temperature, so that it affected the pH that occurred in milk.

As suggested, BRM should be storage at 4°C for at least 30 days to maintain the stability (Kittibunchakul et al., 2021). Twenty-six days is a critical point for changes in product quality. The presence of water activity (aw) in

isothermal conditions allows for the growth of bacteria in BRM. Besides the water content, the increase in the pH of BRM was caused by rancidity because of oxidation or hydrolysis of the components in BRM (Michaëlsson et al., 2014). Besides, milk beverages quality is also related to the physiochemical nature, microbial load, contamination and the quality during transportation and storage condition (Aadil et al., 2019).

3.4.1. Determination of the kinetics of dye degradation reaction of nabeez water of ajwa dates in halal beverage

The analysis of dye degradation of the milk was conducted by kinetic testing to see the rate of dye degradation from the milk product. The results of the kinetic analysis of zero, first and second order. Based on the table 2, the reaction order for BRM with nabeez water of ajwa dates type I was in second-order. It shows

that the rate of dye degradation of milk is four times faster. So it was needed for an ingredient in producing dairy products. The reaction rate constant of the type I is 0.1701. In the second-order reaction for micronutrient degradation, the reaction rate was equal to the concentration under isothermal conditions (Aljuhani et al., 2019).

On the other side, the reaction order for BRM with nabeez water of ajwa dates type II is also in second-order. It shows that the rate of dye degradation is four times faster. So it was needed for an ingredient in producing dairy products. The reaction rate constant of the type II was 0.0624. The kinetics of the reaction in the type II product were influenced by flavonoid content from dates in milk. This compound helps in stabilising BRM products (Mallhi et al., 2014).

Table 2.
Kinetics of dye degradation reaction of nabeez water of ajwa dates

Type of BRM	Reaction Order		
	0	1	2
BRM I	$y = -0,005x + 0,2016$	$y = -0,0289x - 1,5982$	$y = 0,1701x + 4,9197$
	$k = -0,005$	$k = -0,0289$	$k = 0,1701$
	$R^2 = 0,8298$	$R^2 = 0,8551$	$R^2 = 0,8772$
BRM II	$y = -0,005x + 0,3116$	$y = -0,0175x - 1,1649$	$y = 0,0624x + 3,2008$
	$k = -0,005$	$k = -0,0175$	$k = 0,0624$
	$R^2 = 0,8298$	$R^2 = 0,8455$	$R^2 = 0,8601$

3.5. The Effect of nabeez water of ajwa dates on the stability

Milk samples were analysed for the texture using a microscope. The microscope used was a light microscope with a magnification of 400 times. BRM I

showed a less dense milk texture, specifically the molecules have far apart between the constituent particles. While BRM II has a denser particle density than BRM I. BRM II has a smaller and more regular particle size than BRM I. The texture of BRM was influenced by dates mixed in BRM.

Table 3.
Precipitation rate of nabeez water of ajwa dates

Type of BRM	Reaction Order		
	0	1	2
BRM I	$y = -0,2309x + 4,8349$	$y = -0,0845x + 1,6483$	$y = 0,0362x + 0,1425$
	$k = -0,2309$	$k = -0,0845$	$k = 0,0362$
	$R^2 = 0,867$	$R^2 = 0,9463$	$R^2 = 0,9251$
BRM II	$y = -0,2171x + 4,4601$	$y = -0,0883x + 1,5763$	$y = 0,0428x + 0,1436$
	$k = -0,2171$	$k = -0,0883$	$k = 0,0428$
	$R^2 = 0,8721$	$R^2 = 0,9486$	$R^2 = 0,9135$

The precipitation rate of milk was analysed kinetically following the reaction kinetics on the order of 0, 1, and 2. Based on the table 3, the reaction order for BRM I was in first order. It shows the precipitation rate of the milk is two times faster. So it was needed additional ingredient in producing dairy products. The reaction rate constant of BRM I is 0.0845. The instability of milk fat influenced the occurrence of precipitation in

the BRM I product. The formation of clots from the BRM product occurs because of milk fat coagulation.

Based on the table 3, the reaction order for BRM II is in first-order. It shows the precipitation rate of milk undergoes two times faster. So it was needed an ingredient in producing dairy products. The reaction rate constant of BRM II is 0.0883. So that the edible film is added to dairy products to improve the quality of the milk produced, this BRM product is packaged in paper-

based packaging to improve and maintain the quality of BRM.

4. Conclusions

Nabeez water from ajwa dates was prepared through Low-Temperature Long Time (LTLT) Pasteurisation at 80 – 90°C for 0.5 – 1 hours while stirred in 200 rpm and produced homogenous and stable BRM. The BRM I and II were brown with smooth and thick texture. Phytochemical test showed nabeez water contains phenolic, flavonoids, catechol tannins, saponins, and alkaloids with 36 hours of maceration. This study revealed toxicity test showed BRM mix with nabeez water of ajwa dates has biological activity as an antitumor and anticancer with a Lethality Concentration 50 (LC₅₀) value of 721.56 ppm while the characterisation test using FTIR on nabeez water from ajwa dates in halal beverage showed absorption of functional groups such as OH (hydroxide), C=O, C=C, C=CH, and Ar-H.

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