Increased Hemoglobin Levels and Quality of Life in Menstruating Women Consuming Ajwa Date Palm (*Phoenix dactylifera)* Juice

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ABSTRACT

Anemia was prevalent among menstruating adolescent girls, affecting about 32% in Indonesia, and often reduced quality of life. Date palm juice contained carbohydrates, tryptophan, omega-3, vitamin C, vitamin B6, zinc, and magnesium, which could support hemoglobin improvement. This study aims to evaluate the potential of Ajwa date juice as an alternative therapy for women with menstrual anemia. An experimental design included five groups: Ajwa date palm juice (50% concentration) administered once daily (JKA1), twice daily (JKA2), or three times daily (JKA3); a positive control with a commercial anti-anemia product; and a negative control with mineral water. Treatments were given for five days to 25 respondents. Quality of life was assessed using a modified EQ-5D questionnaire, validated with the Pearson correlation test and tested for reliability with Cronbach's alpha. Data were analyzed using one-way ANOVA at a 95% significance level. Results showed the greatest hemoglobin increase in the JKA3 group (mean 2.2 g/dL) and the smallest in JKA1 (1.4 g/dL), with no significant differences between groups ($p > 0.05$). Quality-of-life improvement was achieved fastest in JKA3 (2.4 days), followed by JKA2 and JKA1 (2.8 days each), also without significant differences ($p > 0.05$). In conclusion, Ajwa date palm juice improved hemoglobin levels and quality of life in anemic respondents. The three-times-daily regimen showed the most benefit, although statistical significance was not observed.
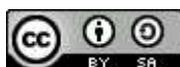
1. Introduction

Menstruation is a fluid that comes out of the uterus as much as 50-150 mL containing blood, tissue, mucus, and endometrial epithelial cells that are released. This process occurs because progesterone and estrogen levels decrease and then stimulate prostaglandins to be released which causes narrowing of the spiral arteriole blood vessels in the uterus. This causes the cells in the endometrial wall to lack oxygen supply and eventually die and then peel off. The endometrial layer becomes very thin, around 2-5 mm, because only the basal stratum remains. Menstrual fluid flows out of the uterus through the cervix into the vagina (Derrickson & Tortora, 2017).

The normal hemoglobin level in adult women is 12-16 g/dL (Natasya et al., 2022). Each menstrual cycle, approximately 42 mg or around 25 ml to 60 ml of iron is excreted. When not menstruating, a woman will lose 1 mg of iron per day. Because the amount of iron absorbed by the body from food is quite limited, the periodic loss of blood during menstruation will also reduce the iron reserves in most women so that it can become a problem (Hadijah et al., 2019), one of which is anemia (Natasya et al., 2022). Anemia was a condition characterized by hemoglobin (Hb) levels in the blood falling below the normal range. In Indonesia, the incidence of anemia had been relatively high, with a prevalence of 32% among adolescents (Riskesdas 2018). This shows that out of 10 adolescents, 3-4 people suffer from anemia. Anemia is influenced by several things, such as poor nutritional intake and lack of physical activity (Kemenkes, 2021). Anemia can reduce a person's quality of life. It can also reduce systemic hemodynamic capacity and cardiac function, increase the incidence of left ventricular hypertrophy, and impair cognitive and sexual function (Suhardjono et al., 2011).

Anemia can be overcome by giving iron supplements to replace iron deficiency in the body. In addition, vitamin C can also be given to increase iron absorption (Nugraha & Yasa, 2022). In addition to vitamin C and iron supplements, anemia can be overcome through food intake. One of the foods that contain these nutrients is dates. Dates are one of the foods that contain high energy because they have carbohydrate compounds, tryptophan, omega 3, vitamin C, vitamin B6, Zn, and Mg (Ma'mum et al., 2020). The type of date that the Prophet liked most to consume was ajwa dates. In addition to increasing hemoglobin levels, ajwa dates can also cleanse toxins in the body and can reduce the risk of diabetes, compared to other types of dates (Mardiana & Apriyanti, 2021). Date juice is a type of special drink that functions to treat and maintain health for the body. This type of drink has a nutritional content that can function to increase hemoglobin levels (Triaananingsih et al., 2021). Ajwa dates can increase hemoglobin levels due to their high iron content, a key ingredient in hemoglobin formation. In addition to increasing hemoglobin levels, ajwa dates also contain other nutrients, such as vitamin B6, which regulates metabolism, thus improving a person's quality of life. Furthermore, due to their high iron content, ajwa dates can also be used to provide iron reserves in the body (Kalsum et al., 2025).

Research on the use of ajwa dates to increase hemoglobin has been conducted. The study was conducted by (Ali et al., 2020) on adolescent female respondents, the results of which showed that ajwa dates can significantly increase hemoglobin levels in respondents. Another study by (Hamsah et al., 2022) on pregnant women, the results of which showed that ajwa dates can also significantly increase hemoglobin levels in respondents. Based on this research, in this study, ajwa dates will be tested on different respondents, namely menstruating women with anemia. Then the preparation is made in the form of juice which is expected to make it easier to consume and more easily absorbed by the body. All of this is expected so that ajwa date juice can be used as an alternative therapy to increase hemoglobin in menstruating women with anemia.

2. Methods

2.1. Population and Sample

The population of this study consisted of female students at Universitas Darussalam Gontor, Female Campus, located in Mantingan, Ngawi, East Java, who were experiencing both menstruation and anemia. The sample was selected using purposive and quota sampling techniques. Purposive sampling referred to a method of selecting participants based on specific predetermined criteria (Lenaini, 2021). The inclusion and exclusion criteria used to determine the sample in this study included: inclusion criteria such as liking and being able to consume dates, and not currently taking blood booster tablets. Exclusion criteria included having a chronic disease and undergoing therapy for chronic disease treatment. Apart from using purposive sampling, the sampling technique also used quotas. Sampling quotas referred to a sampling technique by setting a certain amount (Sinaga, 2014). The number of samples in this study was calculated using the Federer formula as follows:

$(t-1)(n-1) \geq 15$

$(5-1)(n-1) \geq 15$

$4n-4 \geq 15$

$4n \geq 19$

$n \geq 4.75$ (rounded to 5)

Information:

n : replication (number of respondent)

t : number of treatment group

The total number of respondents used in this research was 5 treatments x 5 respondents = 25 people.

2.2. Determination of the Ajwa Date Palm Plant and Ethical Clearance

The determination of the ajwa date palm in this study was submitted to the Indonesian Biological Foundation with number 08.154/Genbinesia/XII/2022 This research also submitted Ethical Clearance approval to the Research Ethics Commission Faculty of Medicine, Universitas Sebelas Maret, Surakarta with number 38/UN27.06.11/KEP/EC.2023.

2.3. Treatment

Dates ready to eat were separated from the seeds, weighed as much as 50 grams, then added with 100 ml of mineral water and blended until smooth and homogeneous so that the concentration was 50%. After that, they were filtered using a sieve to obtain date palm juice. The process of making date juice was carried out every day for 3 types of treatment in this study. The treatment carried out in this study were:

JKA1 = Ajwa date palm juice 1 x a day

JKA2 = Ajwa date palm juice 2 x a day

JKA3 = Ajwa date palm juice 3 x a day

KN = Negative control with mineral water

KP = Positive control with Commercial Anti-Anemia Product 1 x a day

The research subjects were given 100 ml of Ajwa date juice for each treatment. The treatment was carried out for 5 days starting from the first day of menstruation in the respondent. The morning treatment was carried out before breakfast (06.00 am), the afternoon treatment was carried out before lunch (12.00 am), and the evening treatment was carried out before dinner (06.00 pm). During the treatment, the research subjects were prohibited from consuming blood-boosting supplements, and foods containing tannins such as tea, coffee, and seeds.

2.4. Data Collection

2.4.1. *Measurement of Hemoglobin Levels*

Blood sampling was carried out 2 times, namely before and after treatment. Blood was taken using the Easy Touch HB tool, through the fingers. The finger from which blood was

taken was cleaned first using 70% alcohol.

2.4.2. *Quality of Life Measurement*

Quality of life was defined as an individual's perception of his position in life (Sari et al., 2017). One instrument that could be used to measure the quality of life was a questionnaire. The questionnaire that was used in this study was a modified version of the EuroQol-5 Dimension (EQ-5D) questionnaire (Sari et al., 2015). Part of the questionnaire classified research subjects into health status in 5 dimensions, namely the ability to walk/move, self-care, usual activities, pain/discomfort, and anxiety/depression. To measure the quality of life, the research subjects were asked to answer questions on the questionnaire directly and independently. The questionnaire used to measure quality of life was tested for validity and reliability before use. Validity was tested using the Pearson Correlation statistical test. The questionnaire was declared valid if the Pearson correlation value was above 0.30 (Sari et al., 2015). The reliability test was carried out using 25 respondents who had the same inclusion and exclusion criteria as the experimental subjects. The reliability of the questionnaire was tested with the Cronbach Alpha statistical test. The questionnaire was declared reliable if the Cronbach Alpha had a p-value > 0.6. The higher the value obtained, the better the level of reliability for each question item contained in the questionnaire (Sukawati et al., 2021). The questionnaire used in this study was declared reliable because the Cronbach Alpha value was 0.8.

2.5. Data Analysis

2.5.1. *Hemoglobin Measurement Data*

The hemoglobin level measurement data were tested for normality using Shapiro- Wilk. Because the data were normally distributed (p>0.05), the analysis was continued using the One Way Anova and Post Hoc LSD test. The statistical program that was used was SPSS 16.0 with a significance level of 95%.

2.5.2. *Quality of Life Measurement Data*

The EQ-5D questionnaire consisted of 5 dimensions with 5 levels of answers, ranging from no problems to very serious problems (Sukawati et al., 2021). The questionnaire was given points, namely level 1: no difficulty; level 2: a little difficulty; level 3: quite difficult; level 4; very difficult and level 5: extreme (Tondok et al., 2021). The EQ-5D questionnaire was converted into a utility value using a value set. In this study, the researcher used the Indonesian value set that had been developed by other researchers (Mursyid et al., 2019). The range of EQ-5D utility values was between 0-1, with a value of 0 meaning a very poor health condition to death and a value of 1 meaning very good health. The questionnaire assessment was measured based on a descriptive analysis of the percentage of respondents who had a health state = 11111, which was called the ceiling effect (Sukawati et al., 2021).

3. Results and Discussion

3.1. Results

Hemoglobin levels were measured twice, before and after treatment, then the increase in hemoglobin levels was calculated by subtracting the hemoglobin levels before treatment from the hemoglobin levels after treatment. The amount of increase in hemoglobin levels is shown in Table 1.

Table 1 Data on increased hemoglobin levels

Treatment	n	Increased hemoglobin levels (g/dL)					Mean (g/dL)	One-way ANOVA
		1	2	3	4	5		
KN	5	1.1	0.7	0.7	4.6	0.5	1.5	
JKA1	5	1.8	0.9	0.8	1.3	2.2	1.4	0.567
JKA2	5	2.1	1.3	0.8	1.5	0.9	1.3	
JKA3	5	1.8	1.4	2.5	2.8	2.3	2.2	
KP	5	1.4	1.4	1.6	2.3	3.1	2.0	

n: Replication; KN: Negative control with mineral water; KP: Positive control with Commercial Anti-Anemia Product 1 x a day; JKA1: Ajwa date palm juice 1 x a day; JKA2: Ajwa date palm juice 2 x a day; JKA3: Ajwa date palm juice 3 x a day

The range of EQ-5D utility values is between 0-1, with a value of 0 meaning a very poor health condition to death and a value of 1 meaning very good health. Measuring the respondent's quality of life by calculating the number of days of increasing quality of life to a value of 1, obtained data as in Figure 1 and Table 2.
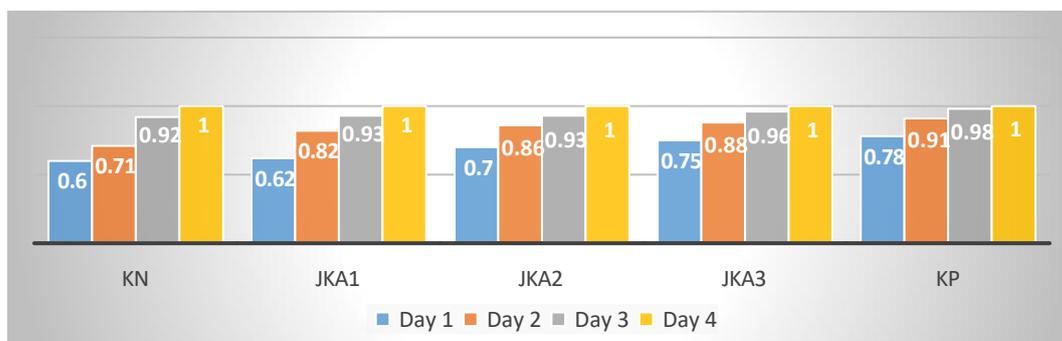

Figure 1 The average data on improving respondent's quality of life (KN: Negative control with mineral water; KP: Positive control with Commercial Anti-Anemia Product 1 x a day; JKA1: Ajwa date palm juice 1 x a day; JKA2: Ajwa date palm juice 2 x a day; JKA3: Ajwa date palm juice 3 x a day)

Table 2 The number of days of increasing quality of life to a value of 1

Treatment	n	The number of days of increasing quality of life (day)					Mean (day)	One-way ANOVA
		1	2	3	4	5		
KN	5	3	3	3	3	4	3.2	
JKA1	5	2	3	2	4	3	2.8	0.558
JKA2	5	4	3	2	3	2	2.8	
JKA3	5	2	3	2	3	2	2.4	
KP	5	4	3	2	3	2	2.8	

n: Replication; KN: Negative control with mineral water; KP: Positive control with Commercial Anti-Anemia Product 1 x a day; JKA1: Ajwa date palm juice 1 x a day; JKA2: Ajwa date palm juice 2 x a day; JKA3: Ajwa date palm juice 3 x a day

3.2. Discussion

The research data (table 1) shows that all treatment group experienced an increase in hemoglobin levels after treatment. Although the increase in hemoglobin levels for each treatment was different, the hemoglobin levels of respondents for each treatment increased towards normal hemoglobin levels, namely 12.0-15.5 g/dL (Aliviameita & Puspitasari, 2019). To assess the statistical significance of the increase in hemoglobin levels, the data were first tested for normality using the Shapiro-Wilk test, yielding a significance value of $p > 0.05$, indicating that the data were normally distributed. Given the normal distribution of the data, a one-way ANOVA was subsequently conducted, resulting in a p-value of 0.567 ($p > 0.05$), which indicated that variations in the frequency of ajwa date juice administration did not have a statistically significant effect on hemoglobin level improvement.

The positive control group, with the Commercial Anti-Anemia Product treatment once a day, showed an increase in hemoglobin levels higher than the KN, JKA1, and JKA2 treatments, but lower than the JKA3 treatments. This is because the Commercial Anti-Anemia Product capsule contains iron (ferum) to form hemoglobin. The results of this study are by the research of Rosidah & Apliliyanti (2017) which showed that giving Commercial Anti-Anemia Product to adolescents who are menstruating causes an increase in hemoglobin levels. This is because the blood-boosting drug contains Fe gluconate. One Commercial Anti-Anemia Product capsule contains Ferrous Gluconate 250 mg, Manganese Sulfate 0.2 mg, Copper Sulfate 0.2 mg, Folic Acid 1.0 mg, Vitamin B 12 7.5 mg, Vitamin C 50 mg and Sorbitol 25 mg. Commercial Anti-Anemia Product capsules contain a lot of iron, therefore if consumed it will increase hemoglobin and ultimately increase the formation of red blood cells (Zulfachri, 2013).

The negative control group, namely the treatment with mineral water, showed an increase in hemoglobin levels higher than the JKA1 and JKA2 treatments, but lower than the KP and JKA3 treatments. This difference in hemoglobin levels is likely due to less than optimal control of food consumption for each respondent between treatments. At the time of the study, the prohibition on types of food and drinks given was only prohibited from consuming foods containing tannins such as tea, coffee, and seeds. Respondents in the negative control group likely consumed foods containing Fe such as spinach or foods containing protein such as tofu, tempe, and eggs. Types of food containing protein such as eggs, tempe, and tofu can also increase Fe absorption and increase hemoglobin formation in the blood (Zaddana et al., 2019).

Hemoglobin was a protein found in erythrocytes that served to transport oxygen from the lungs to body tissues. It possessed a tetrameric structure composed of globin polypeptide chains. Each globin subunit contained a heme group, which was formed from an organic protoporphyrin ring with a central iron ion in the ferrous (Fe^{2+}) state. Each iron ion was capable of binding to and releasing oxygen. The predominant form of hemoglobin in adults was HbA, consisting of two alpha-globin and two beta-globin subunits (Hafen & Sharma, 2022).

Hemoglobin is composed of globin and heme proteins. Globin production occurs in the cytosol of erythrocyte precursor cells through transcription and translation processes. The alpha-globin chain is encoded on chromosome 16, while the beta-globin chain is encoded on chromosome 11. While heme synthesis occurs in the cytosol and mitochondria of erythrocyte precursor cells. This process begins with glycine and succinyl coenzyme A and ends with the production of the protoporphyrin IX ring. Protoporphyrin IX will bind to Fe2+ ions to form heme molecules (Chiabrando et al., 2014).

In the JKA1, JKA2 and JKA3 treatments, the highest increase in hemoglobin was in the JKA3 treatment. The JKA3 treatment also showed a higher increase in hemoglobin levels compared to the KP treatment using Commercial Anti-Anemia Product. This is because ajwa date extract has more complex compounds such as protein, carbohydrates, and fats to support the hemoglobin synthesis process. Succinyl CoA, which is a precursor of the heme molecule

in hemoglobin, is synthesized from α-ketoglutarate derived from acetyl CoA. Acetyl CoA can come from fat and carbohydrate metabolism. Therefore, if the amount of fat and carbohydrate intake from dates increases in the body, it will increase the formation of heme molecules which will ultimately increase hemoglobin levels (Irmawati & Rosdiana, 2020). The results of this study are in line with research conducted by Kusumawati which showed that postpartum mothers who consumed one spoonful of date juice three times a day for one week showed an increase in Hb levels of 1.2 gr/dL (Ridwan et al., 2018).

One instrument that was utilized to assess quality of life was the European Quality of Life Five Dimensions (EQ-5D) questionnaire. The EQ-5D was developed by the EuroQol Group. Its descriptive system comprised five domains of quality of life to evaluate health status: mobility (the ability to walk or move), self-care, usual activities, pain or discomfort, and anxiety or depression (Ridwan et al., 2018).

Based on the results of interviews with respondents in each treatment group using the EQ-5D questionnaire, data on the health state of respondents was obtained for each dimension of the problem based on the questionnaire. The health state results that have been obtained are then calculated using a value set. The value set used in this study is the Indonesian value set that has been developed by other researchers (Purba et al., 2017). This health status can be converted into a single index value based on the values set in the value set table. To obtain the utility of the EQ-5D health level, it can be calculated as follows: 1-(mobility domain + self care domain + usual activity domain + pain domain + anxiety domain) (Reenen et al., 2019).

Based on the data in Figure 1, it can be seen that the average quality of life in each treatment group increased from the first day to the 4th day. Meanwhile, the data in Table 2 shows that the treatment that most rapidly improved quality of life (based on the number of days respondents achieved quality of life with point 1) was the JKA2 group (an average of 2.4 days). This data aligns with the highest increase in hemoglobin levels in the JKA2 group (Table 1). This suggests that one factor that can improve the quality of life for menstruating women with anemia is increased hemoglobin levels.

In the positive control group, the increase in quality of life was due to Commercial Anti-Anemia Product containing iron, vitamins, and other minerals so that the nutrients needed by the body could be met (Zulfachri, 2013). While in the negative control group, even without treatment, the quality of life also increased. This is due to several factors other than hemoglobin levels that can affect quality of life, including nutritional status, physical activity, and eating patterns of respondents (Putri et al., 2015).

In the domain of walking or moving ability contained in the questionnaire, it is used as a parameter for respondents in their ability to walk or move during menstruation, so that it can describe the respondent's ability to carry out daily activities during menstruation. In the JKA1, JKA2 and JKA3 treatments with Ajwa date juice treatment, the respondent's quality of life also increased. The increase in the respondent's quality of life in domain 1, namely mobility (ability to walk/move), showed an improvement from day to day. Carbohydrate compounds such as glucose, fructose, and sucrose in Ajwa dates can help meet energy needs so that they can help increase respondents' mobility. Foods that contain high energy are very good for increasing stamina. Dates are a type of fruit that contains a lot of energy, which is 260 kcal per 100 g. Date energy comes from complex carbohydrate compounds, especially in the form of sucrose. Therefore, dates in the form of juice can be used as an instant energy source. Date juice contains 67.97 g/100 g of glucose. This figure is higher compared to glucose in biscuits, crackers and donuts, which is between 20-40 g/100 g (Hardiansyah et al., 2011). In the self-care domain contained in the questionnaire can describe the ability of respon- dents to perform self-care during menstruation. There was an increase in the quality of life of respondents shown not only in mobility but also in self-care and usual activities. The iron in dates is one of the compounds that acts as a hemoglobin-forming substance and also plays a role in energy metabolism. In each cell, iron works together with protein (electron transport), which plays a

role in the end of energy metabolism (Fadila et al., 2018). So that carbohydrates and iron as energy-producing components in dates affect the increase in the quality of life of respondents.

The pain domain contained in the questionnaire is used as a parameter for respondents in feeling pain during menstruation, which can interfere with daily activities. Improvement in quality of life in the pain domain also shows improvement. Pain during menstruation can interfere with daily life activities and can reduce quality of life. The content of dates such as phenolics and flavonoids has anti-inflammatory activity, so it can help reduce pain in respondents. This is because the content of phenolic acid and flavonoids can inhibit the formation of prostaglandin endoperoxides, which can cause the cessation of inflammatory mediators such as prostaglandins, and thromboxanes. Meanwhile, ethyl acetate, methanol, and water from ajwa dates inhibit the cyclooxygenase enzymes both COX-1 and COX-2 (Royani et al., 2022). Research conducted by Musa et al. (2017) regarding the effects of dates in reducing gastric damage in Wistar rats showed that there was a protective effect against gastric damage due to ethanol.

In the stress or depression domain, the questionnaire is used as a parameter for respondents feeling stressed during menstruation. In measuring the quality of life of respondents in the 5th domain, namely stress/depression, there was also an improvement. This is because dates contain tryptophan protein. Ajwa dates contain 53 mg of tryptophan (Assirey, 2015). Tryptophan is an amino acid that stimulates the formation of serotonin. Serotonin is a chemical that functions to help brain signals to cells through the synapse space from sending cells to receiving cells. In a state of depression, serotonin levels are low or serotonin returns to its original position too quickly, after helping to convey messages from the synapse. In this condition, the tryptophan content in dates causes a sufficient amount of serotonin to be able to regulate mood and fight stress (Praristiya, 2020).

4. Conclusion

Ajwa date juice can be used as an alternative therapy to increase hemoglobin levels and the quality of life of anemic menstruating women, with the highest increase occurring in the 3 x daily treatment, although statistically the results obtained were not significant (p>0.05). The level of significance of Ajwa date juice treatment on increasing hemoglobin levels and quality of life can be determined by increasing the concentration, combination therapy, extending the treatment time or by making Ajwa date preparations in forms other than juice.

References

Ali, S., Alam, G., & Samrichard. (2020). Ajwa Date Fruit (Phoenix dactylifera L.) in Increasing Hemoglobin (Hb) Level to Teenage Girl. Enfermería Clínica, 30(2), 77–79.

Aliviameita, A., & Puspitasari, P. (2019). Buku Ajar Hematologi. UMSIDA Press.

Assirey, E. A. R. (2015). Nutritional Composition of Fruit of 10 Date Palm (Phoenix dactylifera L.) Cultivars Grown in Saudi Arabia. Journal of Taibah University for Science, 9(1), 75–79. https://doi.org/10.1016/j.jtusci.2014.07.002

Chiabrando, D., Mercurio, S., & Tolosano, E. (2014). Heme and Erythropoieis: More Than a Structural Role. Haematologica, 99(9), 973–983.

Derrickson, B. H., & Tortora, G. J. (2017). Tortora's Principles of Anatomy & Physiology ([15th ed.]). Wiley.

Fadila, F., Wasita, B., & Dirgahayu, P. (2018). Pengaruh Kurma (Phoenix dactylifera L.) terhadap Berat Badan Tikus Putih Jantan (Rattus norvegicus). Jurnal Kesehatan Kusuma Husada, 9(2), 181–188. https://doi.org/10.34035/jk.v9i2.278

Hadijah, S., Hasnawati, H., & Hafid, M. P. (2019). Pengaruh Masa Menstruasi terhadap Kadar Hemoglobin dan Morfologi Eritrosit. Jurnal Media Analis Kesehatan, 10(1), 12. https://doi.org/10.32382/mak.v10i1.861

Hafen, B. B., & Sharma, S. (2022). Oxygen Saturation. Stat Pearls Publishing. https://www.ncbi.nlm.nih.gov/books/NBK525974/

Hamsah, M., Syamsu, R. F., As'ad, S., Bukhari, A., Budiman, N. F., Tammi, Z., & Iffah, N. M. (2022). Effects of Ajwa Dates (Phoenix dactylifera L.) Consumption on Haemoglobin Levels and Nutritional Status. Sapporo Medical Journal, 56(02), 1–9.

Hardiansyah, H., Briawan, D., Rimbawan, R., Sulaeman, A., & Aries, M. (2011). Uji Preferensi, Nilai Antioksidan, Indeks Glikemik serta Pengaruh Konsumsi Sari dan Buah Kurma terhadap Stamina. IPB Press.

Kalsum, U., Putri, A. S., & Ali, S. (2025). The Role of Dates in Increasing Hemoglobin Levels in Women: A Scoping Review. Journal of Pharmaceutical and Sciences, 8(2), 1100–1124.

Kemenkes. (2021). Remaja Sehat Komponen Utama Pembangunan SDM Indonesia. https://sehatnegeriku.kemkes.go.id/baca/umum/20210125/3736851/remaja-sehat-komponen-utama-pembangunan-sdm-indonesia/

Lenaini, I. (2021). Teknik Pengambilan Sampel Purposive dan Snowball Sampling. HISTORIS : Jurnal Kajian, Penelitian & Pengembangan Pendidikan Sejarah, 6(1).

Ma'mum, N. F., Kridawati, A., & Ulfa, L. (2020). Pengaruh Penambahan Sari Kurma Terhadap Kadar Hemoglobin Ibu Hamil Anemia di Klinik Fistha Nanda Tahun 2020. Jurnal Untuk Masyarakat Sehat (JUKMAS), 4(2), 201–215. https://doi.org/10.52643/jukmas.v4i2.1027

Mardiana, N., & Apriyanti, F. (2021). Pengaruh Pemberian Jus Kurma Ajwa (Dactylifera Phoenix) terhadap Kadar Haemoglobin pada Ibu hamil di PMB Nurhayati Wilayah Kerja Puskesmas Kampar. Jurnal Doppler, 5(1), 33–37.

Mursyid, A., Haris, R. N. H., Endarti, D., Wiedyaningsih, C., & Kristina, S. A. (2019). Pengukuran Kualitas Hidup Pasien Kanker Payudara di Kota Denpasar Menggunakan Instrumen EQ-5D-5L. Journal of Management and Pharmacy Practice, 9(3). https://doi.org/10.22146/jmpf.47192

Musa, M. A., Dibal, N. I., Chiroma, M. S., & Makena, W. (2017). Protective Role of Phoenix dactylifera Fruit Against Ethanol-Induced Gastric Ulcer in Wistar Rats. Annals of Research Hospitals, 1(1), 1–7. https://doi.org/10.21037/arh.2017.10.01

Natasya, V. S. A., Arifin, M. Z., & Aini, I. (2022). Analisis Kadar Hemoglobin pada Masa Menstruasi (Literature Review). Jurnal Kebidanan, 12(1), 9–15. https://doi.org/10.35874/jib.v12i1.1007

Nugraha, P. A., & Yasa, A. A. G. W. P. (2022). Anemia Defisiensi Besi: Diagnosis dan Tatalaksana. Ganesha Medicine, 2(1), 49–56. https://doi.org/10.23887/gm.v2i1.47015 Praristiya, M. R. S. (2020). Perbandingan Aktivitas Tonikum Jus Kurma (Phoenix dactylifera L.) dan Suplemen X pada Mencit Jantan. Jurnal Darul Azhar, 8(1), 74–82.

Purba, F. D., Hunfeld, J. A. M., Iskandarsyah, A., Fitriana, T. S., Sadarjoen, S. S., Ramos-Goñi, J. M., Passchier, J., & Busschbach, J. J. V. (2017). The Indonesian EQ-5D-5L

Value Set. PharmacoEconomics, 35(11), 1153–1165. https://doi.org/10.1007/s40273-017-0538-9

Putri, P. H., Sulistiyono, A., & Mahmudah, M. (2015). Analisis Faktor yang Mempengaruhi Anemia pada Kehamilan Usia Remaja. Majalah Obstetri & Ginekologi, 23(1), 33. https://doi.org/10.20473/mog.v23i1.2101

Reenen, M. van, Janssen, B., Stolk, E., Boye, K. S., Herdman, M., Kennedy-Martin, M., Kennedy-Martin, T., & Slaap, B. (2019). EQ-5D-5L User Guide. EuroQol Research Foundation.

Ridwan, M., Lestariningsih, S., & Lestari, G. I. (2018). Konsumsi Buah Kurma Meningkatkan Kadar Hemoglobin pada Remaja Putri. Jurnal Kesehatan Metro Sai Wawai, 11(2), 57–64.

Rosidah, R., & Apriliyanti, L. D. I. (2017). Pengaruh Pemberian Suplemen Zat Penambah Darah terhadap Kadar Hemoglobin pada Wanita Menstruasi. Jurnal of Ners Community, 8(2), 152–158.

Royani, I., Nasrudin, N., Hamzah, M., Latief, S., & Syahril, E. (2022). Potensi Kurma Ajwa (Phoenix dactilifera L.) Bagi Kesehatan Reproduksi Wanita dalam Literatur Islam dan Penelitian Ilmiah Terkini: Literature Review. UMI Medical Journal, 7(2).

Irmawati, S., & Rosdiana, R. (2020). Pengaruh Pemberian Sari Kurma terhadap Peningkatan Kadar Hb pada Ibu Hamil. Jurnal Ilmiah Kesehatan Sandi Husada, 9(2).

Sari, A., Lolita, L., & Fauzia, F. (2017). Pengukuran Kualitas Hidup Pasien Hipertensi di Puskesmas Mergangsan Yogyakarta Menggunakan European Quality of Life 5 Dimensions (EQ5D) Questionnaire dan Visual Analog Scale (VAS). Jurnal Ilmiah Ibnu Sina, 2(1), 1–12.

Sari, A., Yuni Lestari, N., & Aryani Perwitasari, D. (2015). Validasi ST European Quality OF Life-5 Dimensions (EQ-5D) Versi Indonesia Pada Pasien Hipertensi Di Puskesmas Kotagede II Yogyakarta. Pharmaciana, 5(2). https://doi.org/10.12928/pharmaciana.v5i2.2483

Sinaga, D. (2014). Buku Ajar Statistik Dasar. UKI Press.

Suhardjono, Lubis, H.R., Lydia, A., Widodo, Bakri, S., Widiana, I.G.R., Nasution, S.R., Effendi, I., Martakusumah, A.H., Djarwoto, B., Mohani, C.I., Azmi, S., Syukri, M., Partiningrum, D.L., Rasyid, H., Palar, S., Nugroho, P., & Hustrini, N.M. (2011). Konsensus Manajemen Anemia pada Penyakit Ginjal Kronik. Perhimpunan Nefrologi Indonesia.

Sukawati, N. W., Herowati, R., & Andayani, T. M. (2021). Perbandingan Kuesioner EQ-5D-5L dan SF-6D untuk Mengukur Kualitas Hidup Pasien Penyakit Ginjal Kronik di RSUD Kota Yogyakarta. Jurnal Farmasi Indonesia, 18(2), 2302–4291. https://doi.org/10.1159/000150599

Tondok, S. B., Watu, E., & Wahyuni, W. (2021). Validitas Instrumen European Qualitiy of Life (EQ-5D-5L) Versi Indonesia untuk Menilai Kualitas Hidup Penderita Tuberkulosis. Holistik Jurnal Kesehatan, 15(2), 267–273. https://doi.org/10.33024/hjk.v15i2.4759

Triaananingsih, N., Ohorela, F., & Arianti, A. (2021). Sari Kurma Vs Teh Percepatan Persalinan Kala 1 Fase Aktif Ibu Primigravida. CV. Insan Cendekia Mandiri.

Zaddana, C., Indriani, L., Nurdin, N. M., & Sembiring, M. O. (2019). Pengaruh Edukasi Gizi dan Pemberian Tablet Tambah Darah (TTD) terhadap Kenaikan Kadar Hemoglobin

Remaja Putri. FITOFARMAKA: Jurnal Ilmiah Farmasi, 9(2), 131–137. https://doi.org/10.33751/jf.v9i2.1606

Zulfachri, Z. (2013). Pengaruh Pemberian Sangobion terhadap Kadar Hemoglobin setelah Melakukan Aktivitas Fisik Maksimal pada Mahasiswa IKOR. Jurnal Ilmu Keolahragaan, 12(1), 60–75.