International Journal of Biomedical Nursing Review 2023, Volume 2, Number 3: 25-34
P-ISSN: 2963-1556, E-ISSN: 2962-4703

Published by IJBNR

THE EFFECTIVENESS OF HONEY CONSUMPTION ON INCREASING HEMOGLOBIN LEVELS IN YOUNG WOMEN: A SYSTEMATIC REVIEW

Bella Christa[1]*, Hanifa Intan Khairunnisa[1], Saryono[2]
[1] Department of Nutrition, Faculty of Health Sciences, Jenderal Soedirman University
[2] Department of Nursing, Faculty of Health Sciences, Jenderal Soedirman University

ABSTRACT

Background: Adolescents are one of the groups with a high risk of developing anemia. One of the causes of anemia is a lack of hemoglobin in the blood, so iron intake is vital for the body to make hemoglobin. Previous studies have shown that honey consumption has a positive impact on increasing hemoglobin levels. However, more research is required to determine whether honey eating can raise hemoglobin levels in female adolescents. **Objective:** This systematic review's objective is to determine the effectiveness of honey as a herbal ingredient for increasing hemoglobin levels in female adolescents. **Methods:** This study used a systematic review which was processed using the Preferred Reporting Items for Systematic Review and Meta-analyses (PRISMA) technique. The articles included in this study were from electronic databases that published between 2013 and 2023 in Google Scholar, Science Direct, and PubMed. The articles then extracted with due regard to the title and abstract to see their suitability for the topics discussed. **Results:** Out of the six papers chosen, it determined that honey increased hemoglobin levels in female adolescents. Honey contains very good nutrients to increase hemoglobin levels such as iron. The iron content contained in honey is needed to increase erythropoietin as a stimulus for erythrocyte production so that hemoglobin levels can increase. **Conclusion:** Consuming honey can increase hemoglobin levels in female adolescents because it contains a lot of iron, thereby minimizing the occurrence of anemia.

*Correspondence Author :
Bella Christa;
Department of Nutrition,
Faculty of Health Sciences,
Jenderal Soedirman
University, Purwokerto,
Indonesia
bella.christa@mhs.unsoed.
ac.id

Received: 12-01-2023
Approved: 20-5-2023
Published: 24-09-2023

Keywords: Honey, hemoglobin, youth
Citation: Christa, B., Khairunnisa, H. I & Saryono, S. 2023. 'The Effectiveness of Honey Consumption on Increasing Hemoglobin Levels in Young Women: A Systematic Review'. *International Journal of Biomedical Nursing Review*. 2(3). p25-34. https://doi.org/10.20884/1.ijbnr.2023.2.3.8606

INTRODUCTION

Adolescence is a golden period with maximum growth and development, so at this time adolescents face substantial physical and psychological needs (P. Sari et al., 2022). Adolescence is also a crucial time in life's stages, making this age group sensitive and subject to health concerns. One of the health problems that are prone to occur in adolescents, especially young women is anemia caused by a lack of hemoglobin levels in the body (Usman and Buheli, 2019) .

Hemoglobin is a protein that contains the most iron in humans, which makes up more than half of the body's total iron content (Miller, 2013). Hemoglobin as the main component of forming erythrocytes has a crucial role as a carrier of oxygen from the lungs to all parts of the body (Sunarsih et al., 2022). Iron is required for the synthesis of hemoglobin, so if the hemoglobin level is inadequate, there will be a reduction in blood volume to carry oxygen throughout the body (Aryani et al., 2022).

Anemia is a worldwide health issue that affects nations that are both developed and developing (Shahzad et al., 2017). Anemia is generally more prevalent in underdeveloped countries and social groups (Mawani & Aziz Ali, 2016). Anemia is indicated by a decrease in the number of red blood cells and the capacity of hemoglobin to transport oxygen in the body (Mujica-Coopman et al., 2015). Anemia is regarded as the most prevalent nutritional deficit in the world, and 95% of cases are related to inadequate dietary intake (Shahzad et al., 2017). The World

Health Organization (WHO) predicts that half of all cases of anemia are affected by a lack of iron in the body. This deficiency tends to occur when the intake of bioavailable iron is inadequate over a long period. In addition, anemia can also occur due to physical pathologies, including acute and chronic inflammation as well as haematological disorders (Mujica-Coopman et al., 2015).

The World Health Organization (WHO) states that anemia is one of the ten biggest health problems of the modern era, where groups that have a high risk of contracting anemia are women of reproductive age, pregnant women, school-age children, and adolescents (Usman & Buheli, 2019). According to WHO data in 2013, the prevalence of anemia in the world is between 40-88% (Usman & Buheli, 2019). According to data from Basic Health Research (Riskesdas) for 2018, 32% of adolescents in Indonesia had anemia. This prevalence shows that 3-4 out of 10 adolescents suffer from anemia (Novelia et al., 2022). Factors that cause anemia in female adolescents are decreased iron to deficiency due to menstruation and lack of intake of nutrients such as Fe, fat, protein, carbohydrates and energy (A. Sari et al., 2018). In adolescents, anemia can affect their ability to think, decrease academic ability, decrease reproductive health, and decrease physical capacity (Usman & Buheli, 2019).

The problem of anemia that generally occurs in women can be treat by taking iron supplements. Another option is to employ natural substances in pharmaceutical treatments, such as honey, which has vital minerals including calcium, phosphorus, potassium, sodium, iron, magnesium, and copper that can help raise hemoglobin levels (Usman & Buheli, 2019). Therefore, the purpose of this study was to determine the effectiveness of honey as a herbal ingredient to increase hemoglobin levels in female adolescents.

METHOD

Database Search

The method used in this research is a Systematic Review processed using the PRISMA (Preferred Reporting Items for Systematic Review and Meta-analyses) standard. The steps in this study are summarized in Figure 1. The articles in this study were obtained from three electronic databases, namely Google Scholar, ScienceDirect, and PubMed. The articles were published from 2013 to 2023. The keywords used for the literature review were honey AND "hemoglobin" AND (adolescent OR teenager). The inclusion criteria for this study were published during the last ten years (2013–2023), using English, various types of research articles available in full-text form, and discussing the effectiveness of honey consumption on increasing hemoglobin levels in female adolescents. Exclusion criteria in this study were articles that used other than English, in the form of review articles, such as literature reviews or systematic reviews and so on, were not available in full-text form, and were not relevant to the effectiveness of consuming honey on increasing hemoglobin levels in female adolescents.

Data Extraction and Discovery Reports

Articles are obtained based on searches using specified keywords. 164 articles were found in Google Scholar, 38 in ScienceDirect, and 1 in PubMed. The number of these articles has gone through a process of elimination to obtain articles that meet the criteria, such as being published within the last ten years and using English, so only 203 articles are obtained from 3 electronic databases. Furthermore, the screening process is carried out by eliminating multiple published articles. After removal, 200 items remained that satisfied the requirements. The screening was continued by paying attention to titles which included the words "Honey", "Hemoglobin" and "Adolescent". Found 15 articles that match the desired topic, but 4 of them are not research articles nor can they be accessed in full. The final articles acquired were 11 articles after thoroughly checking the whole article. Then we read the abstracts of a number of these articles to see their suitability for the topics discussed in this systematic review. In the end, 6 publications were discovered that satisfied

the criteria for inclusion in a systematic review

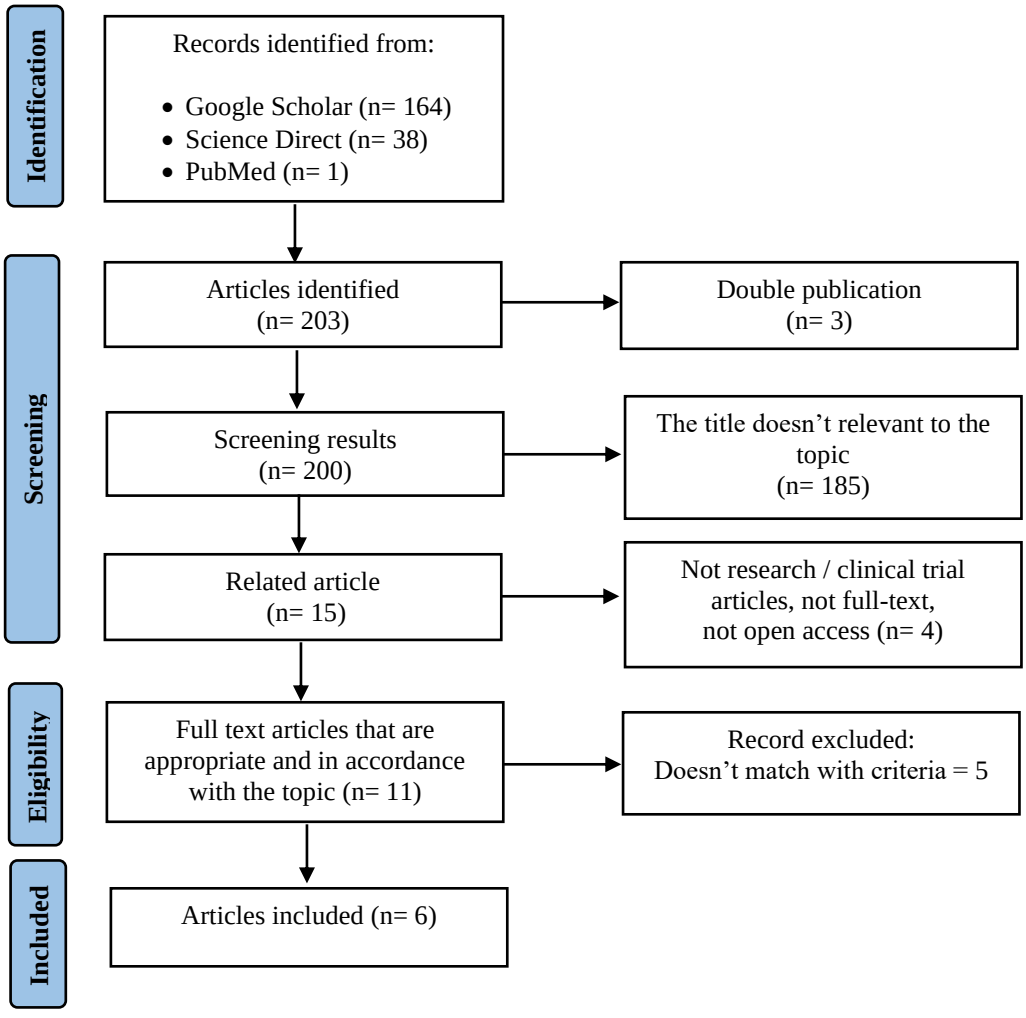

Figure 1. Research Flowchart

RESULTS

Title and Author	Methods	Respondents	Place of Research	Research Results	Conclusion
Effectiveness of Amla Juice with Honey to Improve Hemoglobin Levels in Adolescent Girls with Anemia (Rashmi, 2021)	This study used a quantitative evaluative research approach with a quasi-experimental research design with the one group Pre-and Post-test design.	50 young women from Marappadi village.	Marappadi Village, Kulashekhram, Kanyakumari District.	The results showed that the average pretest score was 9.16 ± 1.29. The mean post-test score was 11.4 ± 1.29. The mean difference is 2.24. Hemoglobin levels could be increased significantly by giving out amla juice and honey.	There was an increase in hemoglobin levels after giving amla juice with honey to anemic young women.
The Influence of Honey Consumption to Haemoglobin Contests When Menstrual at Teenage of Principles in Situbondo (Dewi & Hatimah, 2018)	This study used the Pre-Experiment one Group Pre-test-Postest Design method with the measuring instrument used being the Electrical Hb Gauge (Quick-Check hemoglobin examination system) and the observation sheet.	This study used 150 young women who were menstruating as respondents.	Situbondo, East Java.	The results of the study: there is an effect of giving honey on changes in hemoglobin levels during menstruation in young women.	Honey contains iron which is needed in the formation of hemoglobin and vitamin B6. Consuming honey can help young women who are menstruating have higher hemoglobin levels.
Giving Hylocereus Polyrhizus and Honey in Increasing Hemoglobin Levels in Young Women in SMPN 7 of Gorontalo City (Usman & Buheli, 2019)	This research method is included in the pre-experimental design with two groups of pre-post-test design. Where researchers involved two groups of young women, who were observed before the intervention of giving *Hylocereus polyrhizus* and *Hylocereus polyrhizus* with honey. Then it was observed again after the two interventions were carried out.	All young girls at SMP Negeri 7 Kota Gorontalo, namely 166 people with as many details as 56 students of class VII, 55 students of class VIII, and 55 people in class IX. All of these adolescents are a combination of anemia sufferers and those who are not anemic	Gorontalo, North Sulawesi, Indonesia	Hemoglobin levels before treatment with *Hylocereus polyrhizus* showed an average value of 11.9 ± 1237. While Hb levels after treatment showed an average value of 13.7 ± 1.396. Hemoglobin levels before treatment with *Hylocereus polyrhizus* + honey showed an average value of 12.2 mg ± 1.143 g/dl. Meanwhile, Hb levels after treatment showed an average value of 14.0 ± 1,211 g/dL. The results showed that after receiving Hylocereus polyrhizus + honey, hemoglobin levels increased in 96.7% of all respondents.	The conclusion of the study showed that the administration of *Hylocereus polyrhizus* and *Hylocereus polyrhizus* with honey had a substantial impact on increasing hemoglobin levels in female adolescents at SMPN 7 Kota Gorontalo.
Effect of Yoga Therapy, Supplementation of	The experimental design used for this study was a	Sixty female students studying at Rajiv	Mahe, Pondicherry State, India	The results showed that combining yoga therapy and	Hemoglobin levels increased much more with yoga

Published by IJBNR | International Journal of Biomedical Nursing Review 2023, Volume 2, Number 3: 25-34 | doi: 10.20884/1.ijbnr.2023.2.3.8606

Title and Author	Methods	Respondents	Place of Research	Research Results	Conclusion
Gooseberry With Honey and Combined Intervention on Hemoglobin Concentration among Anaemic Adolescent Girls (Reema & Sekarbabu, 2018)	randomized block design. Analysis of covariance (ANCOVA) was used as a statistical procedure to establish significant differences.	Gandhi Ayurveda Medical College and aged between 18 to 23 years who suffer from iron deficiency anemia.		gooseberry supplementation with honey therapy was substantially more effective than doing just those two things separately.	therapy in combination with gooseberry supplementation with honey therapy than with these two treatments alone.
Effects on Honey dates Amla mix on level of Fatigue on Iron Deficiency Anaemia among Adolescent Girls at Selected Setting (Bhuvaneswari et al., 2018)	The research method used is an experimental design that is correct with pre-test and post-test.	Adolescent girls age group 10-19 years who live in an institutionalized and willing environment participate in research.	-	The results revealed that were significant differences between the pre-test and post-test levels. Hemoglobin levels increased after being fed a combination of honey, dates, and amla. The clinical signs of iron deficiency anemia were also significantly reduced.	Increased hemoglobin levels will significantly decrease fatigue and clinical signs of anemia. Supplementation with a combination of dates, honey, and amla showed significant results in reducing fatigue levels in young women, thus it was known there were increased hemoglobin levels.
Effectiveness of Gooseberry Juice with Honey and Guava Juice with Honey Compared with Control on Physiological Parameters among Adolescent Girls Studying in Selected Schools (Reeta et al., 2018)	This study applies the pre-test and post-test method.	A total of 255 teenage girls with iron deficiency anemia were chosen from schools in Tamilnadu's Dharmapuri district.	Dharmapuri, Tamilnadu, India	The difference between the control and experimental groups I (gooseberry juice with honey) and II (guava juice with honey) was significant. The experimental group I (gooseberry juice with honey) increased Hb, RBC, and PCV more effectively.	Compared to guava juice + honey, the intervention using gooseberry juice + honey is more effective in improving hemoglobin and assisting iron absorption, hence lowering anemia.

Several research studies were conducted in the article to determine the impact of honey consumption on enhancing hemoglobin levels in female teenagers. According to studies (Dewi and Hatimah, 2018), consuming honey may improve hemoglobin levels. It is indicated by the rising frequency of respondents with hemoglobin levels above 12 mg/dl by 70 respondents, or 47% of all respondents (150 people), where previously there were no respondents with hemoglobin levels above 12 mg/dl. The proportion of respondents with hemoglobin levels less than 12 mg/dl also reduced. The result of the research (Rashmi, 2021) indicated an increase in hemoglobin levels in young women suffering from anemia after being given a combination of amla juice and honey. The research's results (Usman and Buheli, 2019) determined a rise in hemoglobin levels in young women when they consumed a mixture of dragon fruit (Hylocereus polyrhizus) and honey. It was proven by the reduction in the number of respondents who had hemoglobin levels under 12 g/dl; initially, there were 11 respondents, but after intervention with a combination of dragon fruit (Hylocereus polyrhizus) and honey, there was only one respondent, or 3.3% of the 30 respondents, who still had hemoglobin levels under 12 g/dl. However, for respondents with Hb levels less than 12 gr/dl who just received Hylocereus Polyrhizus and were not paired with honey, there were still two respondents, or 6.7% of 30 respondents, with Hb levels less than 12 gr/dl. According to the study's conclusions (Reema and Sekarbabu, 2018), offering gooseberry supplements with honey therapy provides a more optimal improvement when combined with yoga therapy. Based on the study's results (Bhuvaneswari et al., 2018), the intake of honey with dates and amla can improve hemoglobin levels in female adolescents. According to the results found in the study (Reeta et al., 2018), the intake of gooseberry juice mixed with honey is more effective than consuming guava juice combined with honey in enhancing hemoglobin levels in anemic adolescent girls. However, honey both provide the effect of increasing hemoglobin levels.

DISCUSSION

Honey is a natural ingredient created by honey bees (Apis mellifera) of the Apidae family from flower nectar (Tafere, 2021). It has long been utilized as a food and product in the health sector (Alvarez-Suarez et al., 2014). Honey is recognized as beneficial for health since it includes a lot of complete nutrients (Laili et al., 2020). Honey consists of iron, which the body needs to produce hemoglobin and vitamin B6. Iron is contained in red blood cells (erythrocytes) of 65%, whereas 30% is in the liver, spleen, and bone marrow tissues, and 5% remains in the cell nucleus, plasma, and muscles in the form of myoglobin. Hemoglobin is a protein molecule that consists of iron and is present in red blood cells (blood pigment). It is an essential component of hemoglobin (Dewi & Hatimah, 2018).

Iron intake is required to raise hemoglobin levels, particularly in young women. Honey has been found to contain 0.9 mg of iron as well as vitamins, acids, minerals, and enzymes that are beneficial to the human body (Laili et al., 2020). Vitamin C and B complexes are two vitamins found in honey, although they are only in trace amounts. Almost all types of honey include Vitamin C, albeit quantities and antioxidant capabilities vary based on processing, storage, and plant origin (Majtan et al., 2020). Furthermore, it is reported by (Lestari et al., 2019) that honey contains several nutrients required to improve erythropoietin levels. When oxygen levels are low, the primary stimulant that can increase erythrocyte synthesis is the hormone erythropoietin, which means the impact on improving erythrocyte production will be relatively minor in the absence of erythropoietin. The mechanism for the rate of producing erythropoietin and erythrocytes in hypoxic conditions will balance if the erythropoietin system is functioning effectively. The intake of nutrients such as iron, vitamin B12, and folic acid also influences the maturation and rate of erythrocyte formation. As a result, the mechanism of erythropoietin-induced erythrocyte formation plays a significant role in improving hemoglobin levels.

Honey generally consists of 17.1% water, 82.4% carbohydrates, and the other 0.5% protein, amino acids, vitamins, and minerals. It also contains essential amino acids such as lysine, histidine, and tryptophan (Lestari et al., 2019). Flavonoids, polyphenols, reducing chemicals, alkaloids, glycosides, cardiac glycosides, anthraquinones, and volatile compounds are also available in pure honey (Samarghandian et al., 2017). Flavonoids are known to assist groups at risk of iron loading by either reducing the rate of iron absorption in the stomach or altering the tissue distribution of iron (Lesjak & Srai, 2019). Polyphenol supplementation can limit iron absorption but significantly improves erythropoiesis based on more advanced hemoglobin concentrations in healthy individuals and patients with metabolic disorders, according to research studied by (Xu et al., 2021). The antioxidant and anti-inflammatory effects of polyphenols can counterbalance the limiting impact of iron on erythropoiesis.

Honey includes rich nutrients, one of which is iron, and therefore it may be utilized to improve hemoglobin levels and provide an alternative therapy for anemic women (Laili et al., 2020). Honey's protein, vitamin, and mineral content can help build iron production in the blood. Honey consumption can also meet the requirements for precursors such as iron, vitamin C, vitamin B12, and cobalt, which are necessary for the formation of red blood cells and hemoglobin in the spinal cord (Andriana & Laila, 2022). According to the results of field research, respondents saw significant changes in hemoglobin levels when they consumed honey. Previous studies have found that ingesting honey also gained a positive effect on hemoglobin, as evidenced by an increase in hemoglobin levels in the blood by 5% (from 75% to 80%) in the first week after intervention with honey (Dewi & Hatimah, 2018).

On the other hand, the iron in honey can interfere with zinc absorption as a nutrient that can improve hemoglobin levels because they both fight for binding to metallothionein. Because iron and zinc have comparable transporters, their absorption influences each other. Iron in honey paired with zinc will prevent zinc absorption depending on the availability of transferrin. It can occur if the body intake iron (in honey) and zinc in doses more than once a day (Sunarsih et al., 2022).

Honey is capable of being eaten directly or paired with other ingredients in the intervention of delivering honey to improve hemoglobin levels. For example, (Rashmi, 2021) conducted a study on 50 people who had anemia and gave them amla juice mixed with honey as an intervention. The intervention lasted 21 days and has proven effective in improving hemoglobin in female adolescents. In accordance with studies (Bhuvaneswari et al., 2018), providing honey paired with dates and amla has been proven to increase hemoglobin levels in female adolescents. That is suggested by decreasing fatigue which is an indicator of anemia. Because of this combination of dates, honey, and amla is one of the best iron-rich foods (Bhuvaneswari et al., 2018).

Research conducted by (Reeta et al., 2018) also showed the intervention using honey combined with other ingredients was effective. The results showed that the intervention in group 1 (gooseberry juice + honey) was more successful than the intervention in group 2 (guava juice + honey) in increasing iron absorption and decreasing anemia. It is because gooseberries have a higher Vitamin C content (600 mg/100 gm) than guava (300 mg/100 gm) (Reeta et al., 2018). Vitamin C has a significant role in the body, particularly in iron absorption, which can indirectly impact the hemoglobin production rate (Lauryn et al., 2021). However, according to research (Reema & Sekarbabu, 2018), delivering honey therapy paired with gooseberry supplementation still requires a combination of yoga therapy to achieve a more optimal increase in hemoglobin levels. That is because physical activity supports an increase in blood volume and total hemoglobin content. Balanced nutrition and exercise consumption are two

key demands that promote healthy people (Reema & Sekarbabu, 2018).

CONCLUSION

Lack of hemoglobin in the body can result in iron deficiency anemia if not immediately carried out treatment or prevention. Adolescents are one of the groups at risk of experiencing anemia caused by a lack of hemoglobin levels in the blood. Honey contains iron and other nutrients needed to increase erythropoietin as an erythrocyte production stimulus so that hemoglobin levels can increase. Honey's efficiency is also enhanced when combined with additional components such as amla fruit or gooseberry, dragon fruit (Hylocereus polyrhizus), and dates, which showed positive results on increased hemoglobin in female adolescents.

RECOMMENDATION

Consuming honey can raise hemoglobin levels in female teenagers, even though it is still necessary to take in other foods high in iron to achieve a more optimal increase in hemoglobin levels. Young women must also pay attention to the nutrients they consume to reduce the risk of anemia caused by a drop in hemoglobin levels.

REFERENCES

Alvarez-Suarez, J. M., Gasparrini, M., Forbes-Hernández, T. Y., Mazzoni, L., & Giampieri, F. (2014). The composition and biological activity of honey: A focus on manuka honey. *Foods*, *3*(3), 420–432. https://doi.org/10.3390/foods3030420

Andriana, & Laila, R. (2022). Health Education of Honey Consumption in Increasing Hemoglobin Levels of pregnant Women in Trimester III in Tambusa Barat Village. *International Journal on Advanced Science, Education, and, Religion, (IJoASER)*, *5*(2), 118–126.

Aryani, V., Muthmainah, & Nuhriawangsa, A. (2022). Acceptance Test of Cava Smoothie as an Alternative Drink for Anemic Adolescent Girls. *Proceedings of the International Conference on Sustainable Innovation on Health Sciences and Nursing (ICOSI-HSN 2022)*, *55*, 46–63. https://doi.org/10.2991/978-94-6463-070-1

Bhuvaneswari, G., Kerubhamani, H., & Manggala, P. (2018). Effects on honey dates amla mix on level of fatigue on iron deficiency anaemia among adolescent girls at selected setting. *Research Journal of Pharmacy and Technology*, *11*(8), 3337–3340. https://doi.org/10.5958/0974-360X.2018.00613.3

Dewi, C. P. lukita, & Hatimah, H. (2018). The Influence of Honey Consumption to Haemoglobin Contests When Menstrual at Teenage of Principles. *International Journal of Nursing and Midwifery Science (IJNMS)*, *2*(1), 1–5. https://doi.org/10.29082/IJNMS/2018/VOL2.ISS01.45

Laili, F., Purnani, W. T., & Aminah, S. (2020). The Effect of Administering Honey on the Increasing of Hemoglobin Level in Pregnant Woman with Anemia. *The 2nd Strada International Conference on Health*, *2*(1), 49–52. https://doi.org/10.30994/sich2.v2i1.10

Lauryn, J., Joprang, F. S., Kurniadi, A., Rinaldi, F. X., & Singgih, G. G. (2021). Effectivity of Iron Supplementation With and Without Vitamin C for Increasing Hemoglobin Levels Among Women Aged 16-21 Years Old. *Sriwijaya Journal of Medicine*, *5*(1), 18–24. https://doi.org/10.32539/SJM.v5i1.125

Lesjak, M., & Srai, S. K. S. (2019). Role of dietary flavonoids in iron homeostasis. *Pharmaceuticals*, *12*(3), 1–21. https://doi.org/10.3390/ph12030119

Lestari, I., Frilasari, H., & Lestari, A. E. (2019). Effectiveness of Honey in Increasing Hemoglobin Levels of Mothers Post Sectio Caesarea. *Healt Nations*, *3*(7), 321–328.

Majtan, J., Sojka, M., Palenikova, H., Bucekova, M., & Majkan, V. (2020). Vitamin C Enhances the Antibacterial Activity of Honey against Planktonic and Biofilm-Embedded Bacteria. *Molecules*, *25*(4), 992.

Mawani, M., & Aziz Ali, S. (2016). Iron Deficiency Anemia among Women of Reproductive Age, an Important Public Health Problem: Situation Analysis. *Reproductive System & Sexual Disorders*, *5*(3), 1–6.

https://doi.org/10.4172/2161-038x.1000187

Miller, J. L. (2013). Iron deficiency anemia: A common and curable disease. *Cold Spring Harbor Perspectives in Medicine*, *3*(7), 1–14. https://doi.org/10.1101/cshperspect.a011866

Mujica-Coopman, M. F., Brito, A., Romaña, D. L. de, Ríos-Castillo, I., Cori, H., & Olivares, M. (2015). Prevalence of Anemia in Latin America and the Caribbean. *Food and Nutrition Bulletin*, *36*(2), S119–S128. https://doi.org/10.1177/0379572115585775

Novelia, S., Rukmaini, & Sari, I. P. (2022). The Analysis of Factors Associated with Anemia Among Adolescent Girls. *Nursing and Health Sciences Journal (NHSJ)*, *2*(3), 266–273. https://doi.org/10.53713/nhs.v2i3.142

Rashmi, R.-R. J. of. (2021). Effectiveness of Amla Juice with Honey to Improve Hemoglobin Levels in Adolescent Girls with Anemia. *Journal of Nursing Sciences*, *2*(11), 46–49. https://journalgrid.com/view/article/rjns/308

Reema, C. K., & Sekarbabu, K. (2018). Effect of yoga therapy, supplementation of gooseberry with honey and combined intervention on hemoglobin concentration among anaemic adolescent girls. *International Jounal of Research in Social Sciences*, *8*(4), 970–976.

Reeta, R., Vijayaraghavan, R., & Vaidyanathan, R. (2018). Effectiveness of Gooseberry Juice with Honey and Guava Juice with Honey Compared with Control on Physiological Parameters among Adolescent Girls Studying in Selected Schools. *Indian Journal of Public Health Research and Development*, *9*(2), 86–91. https://doi.org/10.5958/0976-5506.2018.00260.7

Samarghandian, S., Farkhondeh, T., & Samini, F. (2017). Honey and health: A review of recent clinical research. *Pharmacognosy Research*, *9*(2), 121–127. https://doi.org/10.4103/0974-8490.204647

Sari, A., Pamungkasari, E. P., & Dewi, Y. L. R. (2018). The addition of dates palm (Phoenix dactylifera) on iron supplementation (Fe) increases the hemoglobin level of adolescent girls with anemia. *Bali Medical Journal*, *7*(2), 356–360. https://doi.org/10.15562/bmj.v7i2.987

Sari, P., Herawati, D. M. D., Dhamayanti, M., & Hilmanto, D. (2022). Anemia among Adolescent Girls in West Java, Indonesia: Related Factors and Consequences on the Quality of Life. *Nutrients*, *14*(18), 3777. https://doi.org/10.3390/nu14183777

Shahzad, S., Islam, K., Azhar, S., Fiza, S., Ahmed, W., & Murtaza, Z. (2017). Impact of Knowledge, Attitude and Practice on Iron Deficiency Anaemia Status Among Females of Reproductive Age Group (20-21-year-old) Studying in Government Home Economics College Lahore, Pakistan. *International Archives of BioMedical and Clinical Research*, *3*(4), 31–36. https://doi.org/10.21276/iabcr.2017.3.4.09

Sunarsih, E. S., Dana, Y. A., & Kumala, C. M. (2022). The combined effect of zinc and honey to increase hemoglobin and albumin levels in white rats induced by low protein diet. *International Journal of Advances in Applied Sciences*, *11*(4), 296. https://doi.org/10.11591/ijaas.v11.i4.pp296-305

Tafere, D. A. (2021). Chemical composition and uses of Honey: A Review. *Journal of Food Science and Nutrition Research*, *4*, 194–201.

Usman, L., & Buheli, K. L. (2019). Giving Hylocereus Polyrhizus and Honey in in-Creasing Hemoglobin Levels in Young Women in. *Proceeding of IICSDGs*, *2*, 115–124.

Xu, T., Zhang, X., Liu, Y., Wang, H., Luo, J., Luo, Y., & An, P. (2021). Effects of dietary polyphenol supplementation on iron status and erythropoiesis: a systematic review and meta-analysis of randomized controlled trials. *American Journal of Clinical Nutrition*, *114*(2), 780–793. https://doi.org/10.1093/ajcn/nqab068