Science Midwifery, Vol 12, No. 6, February 2025 ISSN 2086-7689 (Print) | 2721-9453 (Online)

Contents lists available at IOCS

Science Midwifery

journal homepage: www.midwifery.iocspublisher.org

Analyzing the relationship between dietary factors and anemia to improve preventive behavior in adolescent girls in Denpasar

Anak Agung Ngurah Alit Dwi Nanda Wibawa[1], I Wayan Weta[2], Luh Seri Ani[3], Syuma Adhy Awan[4]

[1] Medical Education Study Program, Faculty of Medicine, Universitas Udayana, Denpasar, Indonesia
[2,4] Clinical Nutrition Department, RSUP Prof. Dr. I.G.N.G. Ngoerah Sanglah Denpasar, Indonesia
[3] Department of Public Health and Preventive Medicine, Faculty of Medicine, Universitas Udayana, Denpasar, Indonesia

ARTICLE INFO

Article history:

Received Dec 31, 2024
Revised Jan 11, 2025
Accepted Jan 15, 2025

Keywords:

Adolescence
Anemia
Cross-Sectional
Diet
Hemoglobin Level

ABSTRACT

Adolescents are at risk of developing anemia related to an unbalanced diet, habits of consuming low-iron foods, and substances that inhibit iron absorption, such as tea or coffee. Based on this, this study is aimed at finding out the relationship between diet and anemia status in adolescent girls. A cross-sectional study was conducted on 91 female students who were selected by the proportional random sample method. The research was conducted at SMAN 4 Denpasar-Bali, Indonesia. Hemoglobin level data was measured using a hemoglobinometer. Anemia is defined by a hemoglobin level of less than 12 g/dL. Diet and nutrient intake data were collected by questionnaire method using a quantitative food frequency questionnaire. The data were analyzed univariate and bivariate. The Mann-Whitney U test was carried out to determine factors related to anemia in adolescent girls. The results of the study found that the proportion of anemia in adolescent girls was 38.5%. Vitamin C intake was found to be related to anemia (p value <0.05). Meanwhile, protein intake, iron, fiber, frequency of meals and menstrual blood loss score (KDM) were found not to be related to anemia status (p>0.05). It can be concluded that a diet high in vitamin C is associated with anemia in adolescent girls. The results of this study contribute to the prevention of anemia through dietary improvements in adolescent girls, so it is recommended for adolescent girls to maintain a balanced diet to meet nutritional needs, including the need for iron.

Corresponding Author:

Luh Seri Ani,
Public Health and Preventive Medicine Department,
Medical Faculty,
Universitas Udayana,
Jl. P.B. Sudirman, Dangin Puri Klod, Kec. Denpasar Barat, Kota Denpasar, Bali 80232, Indonesia,
Email: seriani@unud.ac.id

INTRODUCTION

Anemia is a public health problem that can affect human health and social and economic development.(World Health Organization, 2017) Anemia can affect all age groups including adolescents. Adolescent girls are particularly susceptible to iron deficiency in connection with high nutritional needs. Globally, the proportion of anemia in adolescents is reported to be between 25-50%. (World Health Organization, 2017) Different reports get the proportion of anemia in adolescents reaching 40-88% in the world. (Amelia et al., 2021) A total of 3-4 out of 10 adolescents experience anemia caused by less optimal nutritional intake and good activity (Nasruddin et al., 2021)

Indonesia reported a prevalence of anemia in all age groups of 21.70%. The prevalence of anemia in women is reported to be relatively higher than that of men, which is 23.90% compared to 18.40%. The prevalence of anemia in women aged 15 years and older was reported to be 22.70% (Priyanto, 2018) Based on residence, the prevalence of anemia was higher in rural areas (22.80%) than in urban areas (20.60%). Bali Province also reported an incidence of anemia in the age group of 15-18 years of age of 25-30% (Bekti et al., 2023)

Anemia that occurs during adolescence has a variety of impacts on physical, cognitive, and reproductive health for later life. Anemia can affect adolescents' learning ability and physical fitness.(Endang Purwati et al., 2024; Yanti et al., 2024) Anemia also results in reduced immune function which allows adolescent bodies to be more susceptible to disease (Romadhon et al., 2024) Adolescent girls with anemia are at risk of poor pregnancy output during pregnancy such as the risk of giving birth to stunted children, premature birth, and babies with low birth weight (Puteri, 2024; Yanti et al., 2024)

Factors related to anemia in adolescents include knowledge about nutrition, diet and compliance with Fe tablet consumption. (Kemenkes RI, 2024) Another researcher also found that an unbalanced diet, low consumption of foods rich in iron and vitamin C, and bad habits of consuming tea or coffee at the same time as meals, are associated with the incidence of anemia in adolescents (Bekti et al., 2023; Lasmawanti et al., 2022; Sriningrat et al., 2018). Other factors such as irregular or heavy periods, lack of health education, and limited access to iron supplements have been reported to increase the incidence of anemia in adolescent girls (Sitawati & Amanda, 2023; Vaira et al., 2022)

Denpasar is the capital city and at the same time the center of government and economy of the province of Bali, Indonesia. The number of adolescent girls aged 10-19 years in the city of Denpasar was reported to be 534,000 in 2022, increasing to 537,000 in 2023. ,(BPS Kota Denpasar, 2023) Demographically, the population in Denpasar City consists of various ethnicities, cultures and religions.(Wikipedia, 2024) This allows for differences in daily food consumption patterns for adolescents in the city of Denpasar. On the other hand, the wrong diet is at risk of malnutrition, including anemia. Understanding anemia prevention behaviors is needed to reduce the incidence of anemia in adolescent girls

Until now, the incidence of anemia in adolescent girls in Denpasar City still varies. In addition, studies on the relationship between adolescent girls' diet and the incidence of anemia are still limited. The existing study is a study conducted on adolescent girls at SMA Negeri 2 Denpasar got an incidence of anemia of 16.7% (Dewi et al., 2023) This figure is much lower with the incidence of anemia in students of SMK N 1 Manggis which is 35.5% (Sari, Putu, et al., 2018) Adolescents are vulnerable to the risk of anemia because rapid body development and adequate nutritional intake can affect nutritional status in adolescents. (Endang Purwati et al., 2024) Other researchers found that the intake of certain micronutrients such as iron, zinc, vitamin B12, vitamin B6, and copper had a significant association with the incidence of anemia in adolescent girls. (Millaty et al., 2024) Based on this, this study is aimed at analyzing the relationship between diet and the incidence of anemia in adolescent girls in Denpasar City.

RESEARCH METHODS

The design of this study is cross-sectional. The subjects of the study were adolescent girls. The research was carried out at SMA Negeri 4 Denpasar. the target population in the study is all adolescent girls. The population reached is all young women who attend SMAN 4 Denpasar.

A total of 91 students were involved in this study which was selected by a nonrandom method. The students involved in this study are students in grade 10 who are selected by the students based on the opportunities available by the students in connection with the teaching and learning process. Grade 10 students who meet the inclusion and exclusion criteria are selected as a sample. The inclusion criteria are adolescents who are registered as students of SMAN 4 Denpasar and are willing to research subjects and submit informed consent that has been signed by the parents or the person in charge of the student. Meanwhile, the exclusion criteria are students who are absent during data collection and are experiencing menstruation.

Data collection will be carried out from September to December 2024. Before data collection begins, all samples are explained the objectives, benefits, and procedures of the research. Furthermore, students are given the opportunity to decide to participate in the research by submitting signed information as proof of approval. Data were collected by observation method and questionnaire method. Hemoglobin level data was collected by observation method. The measurement of hemoglobin levels was carried out by the researcher himself using a hemoglobinometer. Before the measurement of hemoglobin levels is carried out, the officers have received training in the use of hemoglobinometers from experts. Diet and nutrient intake data were measured by questionnaire method using the semi-quantitative food frequency questionnaire (SQ-FFQ). Before being distributed, the questionnaire was formatted in the form of a google form. Furthermore, the questionnaire was distributed through the WhatsApp contact number of the selected student as a sample.

The overall data was analyzed descriptively and analytically using the Statistical Package for Social Science (SPSS) version 29. Meanwhile, the diet and intake data of nutrient were processed using NutriSurvey2007. Descriptive analysis is carried out with frequency distribution to obtain the proportion of each variable. Meanwhile, the analysis of variation with the chi-square test was carried out to obtain different proportions of anemia based on the student's diet. Multivariate analysis was carried out by logistic regression, to find a relationship between diet and anemia. Hemoglobin levels are categorized as "anemia" if the hemoglobin level is < 12 g/dL and "non-anemia" if the hemoglobin level ≥ 12 g/dL. Dietary data is categorized based on the value of the Recommended Dietary Allowances (RDA) into "< RDA" and "≥ RDA".

This research has been declared feasible by the Research Ethics Commission, Faculty of Medicine, Udayan University with protocol number 2024.01.1.0612.

RESULTS AND DISCUSSION

Table 1 shows that the proportion of anemia in adolescent girls is 38.5%. The incidence of anemia in adolescent girls has increased when compared to the results of Riskesdas in 2018 recorded at 32% at the age of 15-24 years.(Kemenkes, 2022) The range of anemia incidence in adolescent girls in Indonesia is reported to range from 41.4%-66.7%. (Noviona Lingga Fitri et al., 2024) Other developing countries also reported a relatively similar range of anemia incidence rates in adolescent girls, at 37.7% in rural Bangladesh, (Rahman et al., 2024) and at 85% in Bardoli, Gujarat.(Barad & Shetty, 2024)

Table 1. Proportion of anemia in adolescent girls

Anemia Status	n	%
Anemia	35	38.5
Not anemia	56	61.5

The difference in the results of the study on the proportion of anemia in adolescent girls is possible due to the large differences in samples, research regions and measurement methods used. In this study, only carried out in one of the high schools with a sample of 91 respondents, hemoglobin levels were measured using a portable hemoglobinometer. Meanwhile, the basic health research carried out by the Indonesian Ministry of Health was carried out in Indonesian territory with a much larger sample number, namely 165,644 adolescents aged 15-24 years (Kemenkes, 2022) The difference in the research area and the size of the sampling used allows for variations in the results obtained.

Table 2. Describing the proportion of anemia was more common in protein intake < nutritional adequacy rate (RDA) of 40.0%, iron <RDA (40.0%), vitamin C ≥ RDA (56.1), fiber <RDA (65.7), daily meal frequency< 3x/day (62.9), and median < menstrual blood loss score (62.9). The difference in the proportion of anemia was found to be significant with a p < value of 0.05 in all variables except the menstrual blood loss score with a p > value of 0.05.

Table 2. Proportion of anemia based on adequate intake of protein, iron, vitamin C, fiber, frequency of meals, and KDM score in adolescents (n = 91)

Nutritional Intake	Anemia		No Anemia		p
	n	%	n	%	
Protein (g)					0.004
<RDA	14	40.0	21	60.0	
≥ RDA	21	37.5	35	62.5	
Iron (mg)					0.009
<RDA	14	40.0	21	60.0	
≥ RDA	21	37.5	35	62.5	
Vitamin C (mg)					0.001
< RDA	12	24.0	38	74.0	
≥RDA	23	56.1	18	43.9	
Fiber (g)					0.001
< RDA	23	65.7	12	34.3	
≥RDA	22	40.4	34	59.6	
Daily feeding frequency					0.027
< 3 x/day	22	62.9	13	37.1	
≥ 3x/day	13	23.2	43	76.8	
Menstrual blood loss score					0.484
< Median	22	62.9	13	37.1	
≥Median	13	23.2	43	76.8	

The nutritional adequacy of protein intake per day in adolescents is 65 g/day. Meanwhile, the average daily protein intake in the anemia group was 61.51 g/day and the non-anemia group was 118.10 g/day. The daily iron nutritional adequacy rate is 15 mg/day. The average daily iron intake is 15.88 mg/day in the anemia group and 25.31 mg/day in the non-anemia group. The RDA for vitamin C intake in adolescents is 75 mg/day. The average daily intake of vitamin C in the anemia group was 64.07 mg/day and the non-anemia group was 167.32 mg/day. The RDA of fiber intake in adolescents was 37 mg/day. The average daily fiber intake in the anemia group was 13.29 g/day and the non-anemia group was 18.33 mg/day. The average frequency of daily meals was 3 times a day in the anemia group and 4 times a day in the non-anemia group. Meanwhile, the average KDM in the anemia group was 5.23 and the non-anemia group was 3.66.

Table.3 illustrates that the factors related to anemia are vitamin C intake (AOR= 1,024; CI= 1.004-1.044; p=0.020). Adolescent girls with vitamin C intake < RDA are 1 time more likely to experience anemia compared to adolescent girls with vitamin C intake ≥ RDA. Meanwhile, protein intake, iron, fiber, frequency of meals and KDM score were found not to be related to anemia in adolescent girls (p> 0.05). Vitamin C is known to have a role in increasing iron absorption.(Ani, 2013; Krisnanda, 2019) Adding vitamin C intake to the daily diet can prevent anemia in adolescent girls.

Table 3. Results of multivariate analysis

Variable	AOR	CI 95%		p
		Below	Upper	
Protein	1,009	0,987	1,031	0,414
Iron	0,992	0,863	1,140	0,911
Vitamin C	1,024	1,004	1,044	0,020
Fiber	0,816	0,640	1,041	0,101
Daily feeding frequency	1,262	0,740	2,152	0,392
Menstrual blood loss score	0,898	0,708	1,138	0,373

This study obtained different results from other studies that found that protein intake was closely related to the incidence of anemia. The research conducted on adolescent girls at SMK N 1 Manggis, Karangasem Regency found a statistically significant relationship between protein intake and anemia status ($p < 0.01$). (Sari, Sugiani, et al., 2018) This difference is possible due to variations in the type of protein consumed by adolescents. Adolescents in urban areas tend to have a higher intake of animal protein compared to adolescents in rural areas.(Dea Ananda Nur Aeni et al., 2023) Dietary behaviors that are more sourced from plant-based proteins have the risk of deficiency of several nutrients such as iron, calcium, zinc, copper, amino acids, fatty acids, omega 3, omega 6, vitamin D, and Vitamin B12 (Eniwaati et al., 2019) Therefore, adolescents need to choose protein sources, especially vegetable sources that contain high protein. Red beans are a vegetable source that has been proven to be able to increase hemoglobin levels in adolescents. Red beans are known to be rich in iron to prevent anemia.(Sartika et al., 2023)

The intake of iron, fiber, and the frequency of meals per day were found not to be related to the incidence of anemia in adolescent girls. This result is contrary to the results of other studies that have found a relationship with the incidence of anemia in adolescent girls. Research conducted at SMAS PGRI 2 Banjarmasin found a relationship between diet and the incidence of anemia(Vaira et al., 2022) Likewise, research conducted on adolescent girls in Medan and Madrasah Aliyah Negeri Tembilahan Hulu found a relationship between eating habits and the incidence of anemia (Hutasuhut & Supriati, 2022; Rangkuti, 2019) This difference is possible due to differences in the research areas conducted related to the students' eating culture. This research was conducted in urban areas with high school students. Meanwhile, other research was conducted on high school students in areas with different cultures from this study. Menstrual patterns are known to play a role in the incidence of anemia in adolescent girls. (Husanah & Juliarti, 2021; Rangkuti, 2019; Vaira et al., 2022) However. This study obtained the opposite result, where the menstrual bleeding score was not related to the incidence of anemia. This is made possible by differences in the measurement of menstrual events in adolescent girls. In this study, the score of the amount of bleeding during menstruation was measured. While other studies measured menstrual patterns. The influence of hormonal roles in each individual also plays a role in the difference in results. (Hadriani et al., 2023) Hormones play a role in the regulation of iron metabolism and red blood cells. Hormonal fluctuations during the menstrual cycle can affect iron absorption and hemoglobin production. Other factors that also affect this difference in results are differences in sample size, study settings, methodological approaches, and population characteristics so that they have specific and individual results.

CONCLUSION

The prevalence of anemia in adolescent girls is 38.5%. Proportion of anemia is more common in protein, iron and fiber intake < RDA, vitamin C ≥ RDA, daily meal frequency< 3x/day and median < menstrual blood loss score. Anemia status is related to the intake of Vitamin C in adolescent girls. Meanwhile, protein intake, iron, fiber, and frequency of meals, and KDM scores were not related to the incidence of anemia. The results of this study contribute to the understanding of anemia prevention behaviors in adolescent girls through good and correct dietary arrangements, so that nutritional adequacy in adolescent girls is met. Based on this, it is recommended to increase the knowledge of adolescent girls about proper and correct dietary arrangements to prevent the occurrence of anemia.

ACKNOWLEDGEMENTS

Thank you to the Principal of SMAN 4 Denpasar who has given permission to conduct research at the school he leads. Thank you also to the students for their participation in this research.

Reference

Amelia, L., Saputra, R., Lestari, L., Puspita, D., Rahayu, I. D., Purnamawati, D. A., & Almumtahanah, A. (2021). Perfusi Perifer Tidak Efektif (Anemia) Pada An. A di Ruang Anak RSUD Dr. Soedarso Pontianak. *JIK (Jurnal Ilmu Kesehatan)*, *5*(1), 1–8. https://doi.org/https://doi.org/10.33757/jik.v5i1.307.g146

Ani, L. S. (2013). *Buku Saku Anemia Defisiensi Besi: Masa Prahamil dan Hamil*. EGC.

Barad, R., & Shetty, R. (2024). Prevalence of Anemia Among Adolescent School Girls of Bardoli Taluka, Surat, Gujarat. *International Journal for Multidisciplinary Research (IJFMR)*, *6*(5). https://doi.org/https://doi.org/10.36948/ijfmr.2024.v06i05.28287

Bekti, H. S., Dharmawati, I. G. A. A., & Suyasa, I. B. O. (2023). Penyuluhan Kesehatan serta Pemeriksaan Kadar Hemoglobin dan Protein Urin pada Remaja Putri. *Poltekita: Jurnal Pengabdian Masyarakat*, *4*(1), 178–184. https://doi.org/10.33860/pjpm.v4i1.1575

BPS Kota Denpasar. (2023). *Jumlah Penduduk Menurut Kelompok Umur dan Jenis Kelamin di Kota Denpasar, 2022*. https://denpasarkota.bps.go.id/id/statistics-table/3/WVc0MGEyMXBkVFUxY25KeE9HdDZkbTQzWkVkb1p6MDkjMw==/jumlah-penduduk-menurut-kelompok-umur-dan-jenis-kelamin-di-kota-denpasar.html?year=2022

Dea Ananda Nur Aeni, Dwi Kurnia P.S, & Ahmad David Royyifi Arifin. (2023). Analisis Perbedaan Konsumsi Protein pada Remaja Putri Yang Mengalami KEK Usia 15-19 Tahun di Daerah Pesisir dan Non Pesisir. *Sehat Rakyat: Jurnal Kesehatan Masyarakat*, *2*(4), 549–554. https://doi.org/10.54259/sehatrakyat.v2i4.2123

Dewi, K. I. T., Bekti, H. S., Krisna, L. A. W., & Dewi, N. N. A. (2023). Gambaran Kadar Hemoglobin pada Remaja Putri (Studi Kasus di SMA Negeri 2 Denpasar). *Jurnal Skala Husada : The Journal of Health*, *20*(2), 8–14. https://doi.org/10.33992/jsh:tjoh.v20i2.2758

Endang Purwati, A., Nurherliyany, M., Solihah, R., & Wulan Ratna Dewi, S. (2024). Literature Review: Factors Causing Anaemia in Adolescent Girls. *Nurul Ilmi : Journal of Health Sciences and Midwifery*, *2*(1), 26–32. https://doi.org/10.52221/nuri.v2i1.552

Eniwaati, Dewi, R., Trijayanti, W., & Graharti, R. (2019). Hubungan Asupan Protein Nabati Dengan Kadar Hemoglobin Pada Wanita Usia Remaja Vegan Relationship Between Vegetable Protein Intake And Hemoglobin Levels In Vegan Adolescence Women. *Medula*, *9*(2), 233–236. http://repository.lppm.unila.ac.id/21713/1/2632-3339-1-PB.pdf

Hadriani, H., Entoh, C., Radjulaeni, Z., & Astuti, M. D. (2023). Relationship of Diet and Menstrual Cycle with Anemia in Young Women. *Napande: Jurnal Bidan*, *2*(1), 48–53. https://doi.org/10.33860/njb.v2i1.2188

Husanah, E., & Juliarti, W. (2021). Determinants of Anemia in Teenage Girls Madrasah Aliyah Negeri. *Science Midwifery*, *10*(1), 500–505. https://midwifery.iocspublisher.org/index.php/midwifery/article/view/237/212

Hutasuhut, R. M., & Supriati. (2022). Relationship between Body Image and Dietary Status with Anemia in Adolelescent girl in Dusun III Bakaran Batu Village Batang Kuis District Deli Serdang Regency. *Science Midwifery*, *10*(2), 974–979. www.midwifery.iocspublisher.org

Kemenkes. (2022). *Remaja Bebas Anemia: Konsentrasi Belajar Meningkat, Bebas Prestasi*. https://ayosehat.kemkes.go.id/remaja-bebas-anemia-konsentrasi-belajar-meningkat-bebas-prestasi

Kemenkes RI. (2024). *Faktor yang Mempengaruhi Status Anemia Remaja, Apa Saja?* https://yankes.kemkes.go.id/view_artikel/3149/faktor-yang-mempengaruhi-status-anemia-remaja-apa-saja

Krisnanda, R. (2019). Vitamin C Helps in the Absorption of Iron in Iron Deficiency Anemia. *Jurnal Penelitian Perawat Profesional*, *2*(3), 279–286. https://doi.org/10.37287/jppp.v2i3.137

Lasmawanti, S., Siregar, M. A., & Butarbutar, M. H. (2022). The Effectiveness of Nutrition Education on the Improvement of Iron Intake, Protein, and Hemoglobin Levels Towards Zero Stunting at Amanah Deli

Serdang Private Junior High School in 2022. *Science Midwifery*, *10*(4), 2802–2808.

Millaty, N., Shofia, N., Mustika, I., Aurelia, N., Umamah, N. A., Safitri, S., Safitri, Y., & Maulana, W. (2024). Analysis of the Relationship between Adolescent Anemia and Micronutrient Intake. *Proceedings of International Conference on Halal Food and Health Nutrition*, *2*(1), 1–12. https://doi.org/10.29080/ichafohn.v2i1.2016

Nasruddin, H., Faisal Syamsu, R., & Permatasari, D. (2021). Angka Kejadian Anemia Pada Remaja di Indonesia. *Cerdika: Jurnal Ilmiah Indonesia*, *1*(4), 357–364. https://doi.org/10.59141/cerdika.v1i4.66

Noviona Lingga Fitri, Lestari Sudaryanti, & Rize Budi Amalia. (2024). The relationship between nutrition, physical activity, and sleep quality to changes in anemia status in adolescent girls with anemia. *World Journal of Advanced Research and Reviews*, *24*(2), 990–995. https://doi.org/10.30574/wjarr.2024.24.2.3409

Priyanto, L. D. (2018). The Relationship of Age, Educational Background, and Physical Activity on Female Students with Anemia. *Jurnal Berkala Epidemiologi*, *6*(2), 139. https://doi.org/10.20473/jbe.V6I22018.139-146

Puteri, M. D. (2024). *The Impact of Anemia on Adolescent Girls in the Future*. *2*, 74–78.

Rahman, M. J., Rahman, M. M., Sarker, M. H. R., Kakehashi, M., Tsunematsu, M., Ali, M., Ahmed, A., Hawlader, M. D. H., & Shimpuku, Y. (2024). Prevalence and influencing factors with knowledge, attitude, and practice toward anemia among school-going adolescent girls in rural Bangladesh. *PLoS ONE*, *19*(11 November), 1–20. https://doi.org/10.1371/journal.pone.0313071

Rangkuti, S. (2019). The Effect of Eat, Rest and Exercise Habits on Anemia in Adolescents. *Science Midwifery*, *8*(1), 39–41. https://www.midwifery.iocspublisher.org/index.php/midwifery/article/view/138%0Ahttps://www.midwifery.iocspublisher.org/index.php/midwifery/article/download/138/110

Romadhon, W. A., Kartika Sari, Y., Putri, R. D., & Dwi Novitasari, A. (2024). The Analysis of Factors Related to Anemia Levels in Adolescent Girls. *Jurnal Ners Dan Kebidanan (Journal of Ners and Midwifery)*, *11*(2), 146–152. https://doi.org/10.26699/jnk.v11i2.art.p146-152

Sari, M. P., Sugiani, P. P. S., & Kusumayanti, G. A. D. (2018). Pola Konsumsi dan Kebiasaan Konsumsi Tablet Tambah Darah (TTD) dengan Kejadian Anemia pada Remaja Putri di SMKN 1 Manggis, Kabupaten Karangasem. *Jurnal Ilmu Gizi : Journal of Nutrition Science*, *7*(4), 176–182. https://doi.org/https://doi.org/10.33992/jig.v7i4.369

Sari, Putu, P., Sugiani, S., Ayu, G., & Kusumayanti, D. (2018). Pola Konsumsi dan Kebiasaan Konsumsi TTD dengan Kejadian Anemia pada Remaja Putri di SMKN 1 Manggis Kabupaten Karangasem. *Jurnal Ilmu Gizi: Journal of Nutrition Science*, *7*(4), 176–182.

Sartika, T., Evelina, H., & Ringo, S. (2023). Science Midwifery Effect of red bean consumption on hemoglobin levels in female adolescents with anemia. *Science Midwifery*, *11*(2), 2721–9453. www.midwifery.iocspublisher.orgjournalhomepage:www.midwifery.iocspublisher.org

Sitawati, S., & Amanda, F. (2023). Pencegahan Anemia dengan Edukasi Konsumsi Tablet Tambah Darah dan Infused Water. *Jurnal Abdimas ITEKES Bali*, *2*(2), 147–152. https://doi.org/10.37294/jai.v2i2.478

Sriningrat, G. A. A., Yuliyatni, P. C. D., & Ani, L. S. (2018). Prevalensi Anemia pada Remaja Putri di Kota Denpasar. *Jurnal Medika Udayana (JMU)*, *8*(2).

Vaira, R., Karinda, M., & Muflihah, M. (2022). Factors Related Of Anemia in Adolescence Girl. *Science Midwifery*, *10*(4), 2490–2495.

Wikipedia. (2024). *Kota Denpasar*. https://id.wikipedia.org/wiki/Kota_Denpasar#:~:text=Kota Denpasar terdiri dari 4 kecamatan%2C 16 kelurahan%2C,dan kelurahan di Kota Denpasar%2C adalah sebagai berikut%3A

World Health Organization. (2017). Prevention of Iron Deficiency Anaemia in Adolescents Role of Weekly Iron and Folic Acid Supplementation. *Role of Weekly Iron and Folic Acid Suplementation*, 50. http://www.searo.who.int/entity/child_adolescent/documents/sea_cah_2/en/.

Yanti, S., Sari, Y. A. P., & Meilina, A. (2024). Diet, Protein, Iron and Vitamin C Intake on Anemia Status of Adolescent Girls. *Journal of Applied Nursing and Health*, *6*(1), 177–183. https://doi.org/10.55018/janh.v6i1.192