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The Effect of Whatsapp-Based Nutrition Education on Anemia Knowledge and Attitudes Among Female Adolescents In Pidie District

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Abstract

Anemia remains a major public health concern in Indonesia, affecting individuals across all age groups, particularly women and adolescents. According to Basic Health Research (2018), anemia prevalence among women is 48.9%. In Pidie Regency, the prevalence of Iron Deficiency Anemia (IDA) remains high, largely due to low compliance with iron supplement consumption among adolescents. This study aimed to analyze the effect of WhatsApp-based nutrition education on knowledge and attitudes regarding anemia among female adolescents. This quasi-experimental study applied a one-group pretest–posttest design with a non-probability quota sampling method. A total of 42 female adolescents participated. Data were collected using validated structured questionnaires administered before and after the intervention. Nutrition education was delivered through WhatsApp media, focusing on anemia prevention and management. Paired t-test was employed to analyze differences between pretest and posttest scores. Results showed a significant improvement in knowledge, with a mean increase of 10.47 points from baseline ($p = 0.000$). Attitude scores also improved significantly, with a mean increase of 1.19 points ($p = 0.001$, $t = 3.89$, $SD = 1.40$). Overall, the average knowledge improvement reached 10.5 points after the intervention. In conclusion, WhatsApp-based nutrition education proved effective in enhancing both knowledge and attitudes about anemia among female adolescents. This digital health promotion approach offers an accessible, cost-effective, and practical strategy that can be adopted by nutritionists and health workers to strengthen education programs and encourage positive behavior change for anemia prevention.

Keywords: anemia, adolescent girls, digital health intervention, iron deficiency, nutrition education

Introduction

Anemia is still a major health problem that occurs throughout the world and one of the causes is iron deficiency. According to data from the 2018 Riskesdas results, the prevalence of anemia in Indonesia is 48.9% with the proportion of anemia in the age group 15-24 years and 25-34 years (Kemenkes RI, 2018). The prevalence of anemia in Aceh is 36.93% (Riskesdas 2018) in research conducted by Zubir (2018) on young women at Assyifa School Health Vocational School Banda Aceh, showing that out of 65 respondents, 44.6% had moderate anemia and 15, 4% suffer from severe anemia. The most frequent cause of anemia in Rematri is iron deficiency. During menstruation Rematri lose a lot of iron. Lack of iron intake also increases the risk of anemia in

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Rematri. Iron supplementation is known to have a significant effect on reducing the risk of anemia. (Who & Chan, 2011).

Another factor in the occurrence of iron nutritional anemia in young women is knowledge about anemia, attitudes and behavior (Listiana, 2016). Anemia in young women has an impact on growth and development, resistance to infectious diseases, activity, concentration and intelligence and comprehension (Ayu Sriningrat et al, 2019). Signs of anemia in young women include lethargy, weakness, fatigue, fatigue and negligence, often complaining of dizziness and dizzy eyes. Further symptoms are pale eyelids, lips, tongue, skin and palms (Sari, 2020)

Despite its potential, the use of online media in nutrition education also presents challenges. The abundance of unverified or misleading information can confuse the public and lead to unhealthy practices. Therefore, it is crucial to ensure the accuracy, clarity, and reliability of digital content related to nutrition (Denniss et al., 2023). Anemia remains a significant public health issue in Indonesia, with a prevalence of 31.2% among women of reproductive age and 38.4% among children under five as of 2019 (Kemenkes, 2021).

One of the primary contributing factors to the high incidence of anemia among adolescents is the lack of proper knowledge and awareness regarding the condition (Verma & Baniya, 2022). Many teenagers are unaware of the causes, symptoms, and consequences of anemia, which often leads to poor dietary choices and a lack of preventive behaviors, such as iron supplementation or regular health check- ups. In addition, their attitudes toward health, especially nutrition, tend to be shaped by peer influence, social media, and limited school-based health education (Verma & Baniya, 2022). Research has shown that misconceptions about anemia are widespread among adolescents, including the belief that feeling tired is normal or that iron-rich foods are only needed during illness. Moreover, stigma or disinterest in discussing health-related topics, particularly among young males, further hinders effective education and prevention efforts. As a result, many adolescents may live with undiagnosed or untreated anemia, affecting their academic performance, physical stamina, and overall well-being (Silitonga et al., 2024).

The paucity of research on this topic may be due to several factors. First, most nutrition education for adolescents still focuses on conventional approaches such as school lectures or print media. Second, there is lingering skepticism among educators and health professionals about the effectiveness of instant messaging apps for educational purposes, particularly in changing long-term behavior. Third, there are limitations in research designs that can measure the impact of WhatsApp use on changes in knowledge and attitudes in a valid and reliable manner (Kulandaivelu et al., 2023; Raut et al., 2024).

Digital media has become an integral part of modern adolescent life. WhatsApp, as one of the most popular instant messaging apps, holds great potential as a means of delivering health information, including nutrition education (Takkar et al., 2024). However, to date, very little research has specifically assessed the effectiveness of WhatsApp use in improving adolescents' nutritional knowledge and behavior. This gap indicates that the media used daily by adolescents has not been maximized in nutrition education interventions. A study shows that providing nutrition education using media is more effective for increasing adolescent nutrition knowledge daughter compared to providing education without media. Increased knowledge of young women after receiving nutrition education from 7.7% to 82.1% (Rotua, 2017). The limited research on WhatsApp as a medium for adolescent nutrition education raises questions about optimizing digital media, a medium already used daily by adolescents. WhatsApp's potential to improve nutritional

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literacy is significant, given its affordability and ease of content distribution. Nutrition education via WhatsApp can also be delivered in the form of images, infographics, short videos, and interactive discussions, which can increase participant engagement (Takkar et al., 2024).

While such initiatives are commendable, they are limited in scope and reach. The reliance on traditional methods of education may not be sufficient to address the widespread prevalence of anemia in the region. In contrast, studies in other areas have explored the potential of online media as a tool for health education. For instance, research conducted in urban settings has demonstrated the effectiveness of digital platforms in disseminating information about nutrition and anemia prevention. These studies suggest that online media can bridge the gap in health education by providing accessible and engaging content to a broader audience (Septiana et al., 2025).

Therefore, more exploratory and experimental studies are needed to systematically determine the effectiveness of WhatsApp in adolescent nutrition education. Such research could include measuring nutrition knowledge, attitudes, and practices before and after the intervention, as well as analyzing participants' engagement levels during the educational process. Furthermore, it's important to analyze factors influencing successful WhatsApp use, such as content design, message frequency, and the role of the facilitator.With further research, it's hoped that WhatsApp can become an alternative medium for nutrition education that is efficient, affordable, and appropriate for today's digital lifestyles.

Methods

Study Design

This type of research is a quasi-experimental with a single-group pretest-posttest design, which means that the researchers conducted a pretest (before) and posttest (after) procedure on each sample group.

Population and Sample

Population is the entirety of the research objects or objects being studied. The population in this study was all 42 female students at SMA 2 Mutiara, Pidie District. The portion of the population selected in a certain way is considered to be a representation of the population. The sample taken consisted of teenagers aged between 14 and 18 years. This sampling method is known as purposive sampling with inclusion criteria female students aged 14-18 years, willing to participate in the study, and having access to WhatsApp application.

The location was chosen because that is where the workplace is and the problem is still quite common. The study location was selected based on the high prevalence of anemia among female adolescents in this area. Because this is where everyday activities occur, you can better understand what is happening and find solutions that really suit the community. In addition, solving the problem here can help others who face the same challenges in the same place.

Intervention

The nutrition education intervention was delivered through WhatsApp platform over a period of 4 weeks. The intervention consisted of daily educational messages about anemia, including information about iron deficiency anemia causes, symptoms, prevention strategies, importance of iron-rich foods, and proper consumption of iron supplements. Educational materials

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were delivered in the form of text messages, infographics, and short educational videos sent through WhatsApp group. Interactive sessions were conducted twice weekly to encourage discussion and answer questions from participants.

Iron deficiency is a major cause of anemia and poses serious health risks if left untreated. When the body lacks enough iron, it cannot produce sufficient healthy red blood cells to carry oxygen throughout the body. This leads to symptoms such as fatigue, weakness, dizziness, and impaired cognitive function. In severe cases, iron deficiency anemia can cause complications such as delayed growth in children, decreased immune function, and increased risk of pregnancy-related problems. Therefore, addressing iron deficiency is crucial to preventing anemia and maintaining overall health.

Data Collection Instrument

Data were collected using validated questionnaires to measure knowledge and attitudes about anemia. The knowledge questionnaire consisted of 20 multiple-choice questions covering anemia definition, causes, symptoms, prevention, and treatment (Cronbach's alpha = 0.85). The attitude questionnaire contained 15 Likert-scale items measuring participants' attitudes toward anemia prevention and iron supplement consumption (Cronbach's alpha = 0.82). Both questionnaires were administered before the intervention (pretest) and immediately after the 4-week intervention period (posttest).

Data Analysis

Data were collected using validated questionnaires consisting of two aspects:

1. Knowledge questionnaire: 20 multiple-choice items on anemia definition, causes, symptoms, prevention, and treatment (Cronbach's alpha = 0.85). The knowledge aspect included topics on dietary patterns and nutrient intake, anemia prevention, knowledge and perceptions about anemia, as well as causes and misconceptions.
2. Attitude questionnaire: 15 items on a 5-point Likert scale measuring participants' attitudes toward anemia prevention and iron supplement use (Cronbach's alpha = 0.82). The attitude aspect covered attitudes toward healthy and iron-rich dietary patterns, anemia prevention, the dangers and impacts of anemia, as well as attitudes toward causes and misconceptions related to anemia. Both instruments were administered at baseline (pretest) and immediately after the 4-week intervention (posttest).

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Result

The study results showed that students who received educational interventions via WhatsApp achieved higher average scores both before and after counseling, indicating a significant difference in their knowledge levels. Statistical analysis confirmed a significant difference between initial and final knowledge scores ($p = 0.000 < 0.05$). Similarly, students' attitudes also changed between the initial and final measurements ($p = 0.164 < 0.05$). This shift in attitudes is likely influenced by sociocultural and environmental factors within the students' communities.

Knowledge and attitudes toward anemia were assessed using a structured questionnaire developed from relevant literature and validated instruments. The knowledge section included

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multiple-choice and true/false questions covering the definition, causes, signs and symptoms, risk factors, preventive measures, and treatment of anemia. Each correct response was awarded one point, while incorrect or unanswered responses scored zero. Total scores were converted into percentages and categorized as good knowledge (≥75%), moderate knowledge (50%–74%), or poor knowledge (<50%). Attitudes were measured using statements rated on a 5-point Likert scale, assessing perceptions of the importance of anemia prevention, personal susceptibility, willingness to adopt preventive behaviors (such as taking iron supplements), and beliefs about dietary practices. Attitude scores were classified as positive (≥75%), neutral (50%–74%), and negative (<50%).

Paired Sample T-test analysis revealed a significant improvement in students' nutrition knowledge after receiving WhatsApp-based lessons, with an average increase of 10.47 points ($p = 0.000$). This indicates that respondents, who initially had limited knowledge about anemia and the importance of consuming iron tablets, showed a substantial improvement after the intervention. A significant change was also observed in students' attitudes ($p = 0.001 < 0.05$). These improvements in both knowledge and attitudes highlight the effectiveness of WhatsApp as a learning medium, particularly for adolescents who are already familiar with and actively engaged in using this application in their daily lives.

Table 1. The Effect of Using WhatsApp on Before and After Knowledge

Variable	Mean	t	SD	P Value
Knowledge	10,47	6,48	7,10	0.000
Attitudes	1,19	3,89	1,40	0.001

Discussion

WhatsApp is considered an effective tool for educational purposes due to its accessibility, ease of use, and ability to support interactive communication. As one of the most widely used messaging applications worldwide, including in rural and low-income communities, WhatsApp provides a convenient platform for delivering educational content to a broad audience. Its user-friendly interface allows individuals of various ages and technological backgrounds to engage with the app without extensive training. Furthermore, WhatsApp supports diverse media formats such as text messages, images, videos, voice notes, and PDF documents, which makes educational content more engaging and easier to understand (Lee et al., 2023; Takkar et al., 2024).

One of the key strengths of WhatsApp is its capacity for two-way communication. Unlike traditional forms of media, it enables participants to ask questions, provide feedback, and engage in discussions in real time. Group chats foster peer-to-peer learning and create a sense of community, which can motivate participants to stay engaged throughout the learning process. Moreover, WhatsApp is cost-effective and requires minimal internet data compared to video conferencing tools, making it accessible to individuals with limited connectivity or financial resources. Its flexibility also allows learners to access educational materials at any time, enabling self-paced learning. Educators and facilitators can further enhance the process by monitoring participation, sending reminders, and conducting evaluations such as polls or quizzes. Overall,

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WhatsApp combines convenience, low cost, and interactivity, making it a powerful platform for delivering health and nutrition education (Romero-Saritama et al., 2025).

Educational materials presented via WhatsApp in formats such as comics, booklets, or games were effective in making the content easier to understand and more appealing. However, beyond the choice of media, the role of educators is also critical. Educators with strong mastery of the subject matter and good communication skills can better capture students' attention, adapt messages to the audience, and deliver information more effectively (Anugrah et al., 2018). In this study, WhatsApp-based group education successfully increased students' knowledge about anemia, with statistical tests showing significant differences between pretest and posttest scores.

The increase in knowledge scores also aligns with findings from Minokta Lendra (2018), who reported that the use of booklet media in SMA Negeri 1 Pontianak improved students' knowledge of energy adequacy from 58.5% to 81.2%, an increase of 22.7%. These findings highlight the potential of both WhatsApp and booklet media in enhancing students' understanding. In this study, WhatsApp education was novel for many respondents, generating enthusiasm and increasing their participation in the intervention.

Attitude plays an important role in shaping behavior and is categorized as a predisposing factor that motivates individuals to act (Notoatmodjo, 2010). The significant improvement in attitude scores ($p = 0.001$) suggests that better knowledge about anemia encouraged students to adopt more positive perspectives and behaviors related to anemia prevention. This shift may have been influenced not only by the content of the intervention but also by the engaging nature of the media used. Exposure to new educational methods, such as WhatsApp-based counseling and booklet media, increased students' interest and contributed to meaningful changes in their knowledge and attitudes. Overall, this study confirms that WhatsApp is an effective medium for delivering health and nutrition education, capable of improving both knowledge and attitudes among adolescents.

Conclusion

Based on the findings of this study, the knowledge of female students about anemia using WhatsApp media obtained an average increase in score of 10.5. The attitude of female students about anemia using WhatsApp media has an effect on the attitudes of students at SMA 2 Mutiara ($p = 0.000$) / Nutritionists and other health workers are expected to teach students through counseling, counseling, and consultation to increase knowledge and prevent nutritional problems in school children. It is hoped that nutritionists can use WhatsApp to increase knowledge and change the behavior of adolescent girls about anemia in the future because of the sophistication of technology.

References

Agustina, R., Wirawan, F., Sadariskar, A., Setianingsing, A., Nadiya, K., Prafiantini, E., Asri, E., Purwanti, T., Kusyuniati, S., Karyadi, E., & Raut, M. (2021). Associations of Knowledge, Attitude, and Practices toward Anemia with Anemia Prevalence and Height-for-Age Z-Score among Indonesian Adolescent Girls. *Food and Nutrition Bulletin*, *42*. https://doi.org/10.1177/03795721211011136

Budiman, A. R. (2013). Kapita selekta kuesioner pengetahuan dan sikap. Jakarta: Departemen Kesehatan RI.

Journal of Applied Nutrition and Dietetic
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P-ISSN: 2797-7412
DOI : 10.30867/jand.v5i2.952

Denniss, E., Lindberg, R., & McNaughton, S. A. (2023). Quality and accuracy of online nutrition-related information: a systematic review of content analysis studies. *Public Health Nutrition*, *26*(7), 1345–1357. https://doi.org/10.1017/S1368980023000873

Gefter, L., Morioka-Douglas, N., Srivastava, A., Jiang, C. A., Lewis, M., Sanders, L., & Rodriguez, E. (2024). Assessing health behavior change and comparing remote, hybrid and in-person implementation of a school-based health promotion and coaching program for adolescents from low-income communities. *Health Education Research*. https://doi.org/10.1093/her/cyae015

Ghadam, O. S., Sohrabi, Z., Mehrabi, M., Fararouei, M., Shahraki, M., Hejazi, N., Clark, C., Mehrabani, S., Gerami, S., & Nouri, M. (2022). Evaluating the effect of digital game-based nutrition education on anemia indicators in adolescent girls: A randomized clinical trial. *Food Science & Nutrition*, *11*, 863–871. https://doi.org/10.1002/fsn3.3120.

Kemenkes, R. (2021). Buku Saku Hasil Studi Status Gizi Indonesia (SSGI). In *Kementerian Kesehatan RI*. https://doi.org/10.36805/bi.v2i1.301

Kemenkes RI. (2018). Laporan Riskesdas 2018 Nasional. In *Kemenkes RI*. Badan Penelitian dan Pengembangan Kesehatan. https://repository.badankebijakan.kemkes.go.id/id/eprint/3514/1/Laporan Riskesdas 2018 Nasional.pdf

Krishnan, V., Zaki, R., Nahar, A., Jalaludin, M., & Majid, H. (2021). The longitudinal relationship between nutritional status and anaemia among Malaysian adolescents. *The Lancet Regional Health: Western Pacific*, *15*. https://doi.org/10.1016/j.lanwpc.2021.100228

Kulandaivelu, Y., Hamilton, J., Banerjee, A., Gruzd, A., Patel, B., & Stinson, J. (2023). Social Media Interventions for Nutrition Education Among Adolescents: Scoping Review. *JMIR Pediatrics and Parenting*, *6*, e36132. https://doi.org/10.2196/36132

Lee, C. E. (Catherine), Chern, H. H., & Azmir, D. A. (2023). WhatsApp Use in a Higher Education Learning Environment: Perspective of Students of a Malaysian Private University on Academic Performance and Team Effectiveness. *Education Sciences*, *13*(3), 244. https://doi.org/10.3390/educsci13030244

Notoatmodjo, S. 2010. Health Promotion Theory and Applications. Jakarta: Rineka Cipta. Notoatmodjo, S. 2012. Health Research Methods (Revision 2). Jakarta: Rineka Cipta. Notoatmodjo, S. 2012. Health Promotion and Behavioral Sciences 2012 Revised Edition. Jakarta: Rineka Cipta.

Nur Rohim A. Differences in Knowledge of Anemia in Young Women After Being Given Education Using Lecture Methods Without Media and Lectures Using Storybook Media [Publication Manuscript]. Muhammadiyah Surakarta university. Surakarta. 2015.

Ratna Fitriastutik, D. The Effectiveness of Booklets and Guessing Games in Improving Students' Knowledge and Attitudes Class IV Against Dental Caries In SD Negeri 01, 02, and 03 Bandengan District of Jepara, Jepara Regency Academic Year 2009/2010. State University Semarang. 2010.

Raut, S., KC, D., Singh, D. R., Dhungana, R. R., Pradhan, P. M. S., & Sunuwar, D. R. (2024). Effect of nutrition education intervention on nutrition knowledge, attitude, and diet quality among school-going adolescents: a quasi-experimental study. *BMC Nutrition*, *10*(1), 35. https://doi.org/10.1186/s40795-024-00850-0

Romero-Saritama, J. M., Espinosa-Tapia, S., & Palacios-Rodríguez, A. (2025). Using WhatsApp

Journal of Applied Nutrition and Dietetic
Volume 5, Number 2, December 2025
P-ISSN: 2797-7412
DOI : 10.30867/jand.v5i2.952

in Distance Education: Assessing the Impact on Academic Interaction and Influencing Factors. *Social Sciences*, *14*(3), 183. https://doi.org/10.3390/socsci14030183

Septiana, K. S., Adnani, Q. E. S., Susiarno, H., Tarawan, V., Arya, I., & Anwar, R. (2025). The Influence of Anemia Education Media on Increasing Self-Awareness and Compliance in Consuming Iron Supplements in Adolescent Girls: A Systematic Review. *International Journal of Women's Health*, *Volume 17*, 2277–2289. https://doi.org/10.2147/IJWH.S532950

Sharma K ; Stella YD; Joshi A. 2019,Knowledge and attitude of urban and rural adolescent girls regarding anemia. The Pharma Innovation Journal; 8(6) : 1141–1145

Shweta Upadhyay. Media Accessibility, Utilization and Preference for Food and Nutritional Information by Rural Women of India. J Communication. 2011; 2(1): 33-40.

Silitonga, H. T. H., Salim, L. A., & Nurmala, I. (2024). A systematic review of iron supplementation's effects on adolescent girls. *Jurnal Gizi Indonesia (The Indonesian Journal of Nutrition)*, *12*(2), 60–69. https://doi.org/10.14710/jgi.12.2.60-69

Sukmadinata, S. N. (2007). Educational Research Methods. Rosdakarya Youth, Bandung.

Titin Caturiyantiningtiyas (2014).The relationship between knowledge, attitudes and behavior with the incidence of anemia in class X and XI adolescent girls at SMA Negeri 1 Polokart.

Takkar, H., Sharma, K., Karun Kumar, N. V., Jha, M. K., Saraswat, B. K., & Tyagi, H. (2024). MemoChat App: An Advancement in Existing WhatsApp. *2024 1st International Conference on Advances in Computing, Communication and Networking (ICAC2N)*, 22–28. https://doi.org/10.1109/ICAC2N63387.2024.10895869

Verma, K., & Baniya, G. C. (2022). Prevalence, knowledge, and related factor of anemia among school-going adolescent girls in a remote area of western Rajasthan. *Journal of Family Medicine and Primary Care*, *11*(4), 1474–1481. https://doi.org/10.4103/jfmpc.jfmpc_1372_21

Wang, D., Katalambula, L., Modest, A., Ismail, A., Malero, A., Bray, D., Cinq-Mars, H., Tinkasimile, A., Sando, M., Vuai, S., & Fawzi, W. (2024). Meals, Education, and Gardens for In-School Adolescents: A Cluster Randomized Trial of an Adolescent Nutrition Intervention Package in Tanzania. *The Journal of Adolescent Health : Official Publication of the Society for Adolescent Medicine*. https://doi.org/10.1016/j.jadohealth.2024.02.032

Zuraida, R., Lipoeto, N., Masrul, M., & Februhartanty, J. (2020). The Effect of Anemia Free Club Interventions to Improve Knowledge and Attitude of Nutritional Iron Deficiency Anemia Prevention among Adolescent Schoolgirls in Bandar Lampung City, Indonesia. *Open Access Macedonian Journal of Medical Sciences*, *8*, 36–40. https://doi.org/10.3889/oamjms.2020.3287