REVIEW ARTICLE

Effective communication methods in preventing anaemia in adolescents: A systematic review

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Abstract

The incidence of anaemia in adolescents has increased. Apart from increasing nutritional requirements, behavioral changes are needed to prevent anaemia. This systematic review aims to review effective communication methods to prevent anaemia in adolescents. Articles were searched from five electronic databases such as Science-direct, PubMed, Sage, ProQuest, and Springer. An online search for articles was carried out in August 2023 provided that articles were published from 2018 to 2023. The PICOS framework was used as a guide to obtain searchable keywords. Several keywords used for literature searching include "communication methods to prevent anaemia" and "anaemia prevention in adolescence". Following the application of several inclusion and exclusion criteria, including the use of PRISMA flowchart as a guide, a total of 10 articles were shortlisted for the final analysis. The review showed that well-planned communication strategies with communication in integrated health care system is an effective method to promote behavioral changes needed to reduce anaemia in adolescents through dietary/nutritional modifications such as an increase in iron folic acid use among them. This occurs through an increase in knowledge and improved attitude towards the prevention of anaemia among adolescents. *(Afr J Reprod Health 2024; 28 [10s]: 318-331).*

Keywords: Communication; anaemia; prevention; adolescent

Résumé

L'incidence de l'anémie chez les adolescents a augmenté. Outre l'augmentation des besoins nutritionnels, des changements de comportement sont nécessaires pour prévenir l'anémie. Cette revue systématique vise à examiner les méthodes de communication efficaces pour prévenir l'anémie chez les adolescents. Les articles ont été recherchés dans cinq bases de données électroniques telles que Science-direct, PubMed, Sage, ProQuest et Springer. Une recherche d'articles en ligne a été réalisée en août 2023, à condition que les articles aient été publiés entre 2018 et 2023. Le cadre PICOS a été utilisé comme guide pour obtenir des mots-clés consultables. Plusieurs mots-clés utilisés pour la recherche documentaire incluent « méthodes de communication pour prévenir l'anémie » et « prévention de l'anémie à l'adolescence ». Suite à l'application de plusieurs critères d'inclusion et d'exclusion, y compris l'utilisation de l'organigramme PRISMA comme guide, un total de 10 articles ont été présélectionnés pour l'analyse finale. L'examen a montré que des stratégies de communication bien planifiées avec une communication dans un système de soins de santé intégré constituent une méthode efficace pour promouvoir les changements de comportement nécessaires pour réduire l'anémie chez les adolescents grâce à des modifications alimentaires/nutritionnelles telles qu'une augmentation de l'utilisation de fer et d'acide folique parmi eux. Cela se produit grâce à une augmentation des connaissances et à une meilleure attitude envers la prévention de l'anémie chez les adolescents. *(Afr J Reprod Health 2024; 28 [10s]: 318-331).*

Mots-clés: Communication; anémie; prevention; adolescent

Introduction

Anaemia is still a major public health problem in developing countries[1]. Anaemia is a condition where the number of red blood cells or heamoglobin is below normal (≤ 12,0 g/L)[2]. Note that with haemoglobin molecules present inside of the red blood cells, oxygen can be carried throughout the body. Several causes of anaemia exist, the most common cause being iron deficiency[2–4].

Furthermore, research has shown that some subgroups such as teenagers/adolescents and pregnant women are at higher risk of experiencing iron deficiency and anaemia[5] . For example, for adolescents, there is an increased demand for iron for their growth and development, and also to

prepare their reproductive system for pregnancy. Female adolescents can also experience blood loss from heavy menstrual bleeding[6].

could experience excessive blood loss from heavy menstrual bleeding and increased demand for iron for the growth and development of the fetus and placenta[7]. The other hand, during pregnancy, childbirth and postpartum, iron is needed for the growth of the fetus, placenta and to increase the mother's blood volume during pregnancy. Women can also experience bleeding during childbirth, which causes large amounts of iron loss[8].

The prevalence of anaemia among non-pregnant women of childbearing age in the world has been consistent in the last two decades with approximately one-third of women affected (annual estimates range from 29.4% to 33.3%) in 2016[9].. In 2019, global anaemia prevalence was 29.9% (95% uncertainty interval (UI) 27.0%, 32.8%) in women of reproductive age, equivalent to over half a billion women aged 15-49 years[10].As the global population continues to increase, the number of women with anaemia increases every year[9]. Iron deficiency anaemia often occurs in adolescents with an incidence rate of 14% occurring in adolescent girls aged 11-14 years and 27% occurring in adolescent girls aged 15-18 years[11].

Anaemia can be caused by non-nutritional factors such as acute and chronic parasitic infections or diseases (for example, malaria, hookworm infection, schistosomiasis, HIV, Helicobacter pylori infection, tuberculosis, cancer), and genetic conditions (for example, thalassemia and sickle cell trait)[3] Furthermore, early childbirth, high parity, and short birth spacing makes women vulnerable to aneamia[3,7]. However there are environmental or socio-economic factors that can predisposes one to anaemia. These includes poor sanitation, unsafe drinking water, inadequate personal hygiene, economic disparities, politics, institutional capacity/resources, climate/environmental conditions[2] Other predisposing factors include poverty, obesity, low education level, household wealth, cultural norms, lack of empowerment, rural living, inadequate health care, nutritional knowledge, health policies, limited access to health care[2,3].

About 18.4% of maternal mortality is caused by Anaemia, while 23.5% of perinatal mortality is caused by anaemia[12]. . Premature birth and low birth weight in newborns as well as impaired growth and development in infants and children, especially those aged less than 2 years, are also effects of anaemia[12].

Reduction of anaemia is one of the World Health Assembly Global Nutrition Targets for 2025 and of the Sustainable Development Goals (SDGs)[2]. The most effective programmes to prevent anaemia are those that are comprehensive and combine nutrition-specific and nutrition-sensitive interventions and involve a wide range of sectors and actors. Determination of the right mix of strategies should be done through a situation analysis, which considers the magnitude, prevalence and distribution of anaemia and related nutrient deficiencies; food consumption levels, including micronutrient intake; dietary habits, practices and behaviours of vulnerable groups; as well as socioeconomic data to identify constraints and opportunities[8]. Apart from increasing nutritional requirements, behavioral changes are possibly needed to prevent anaemia in adolescents[2,13]. This can possibly lead to a change in human behaviour, which can help to prevent aneamia in adolescents[13]. Health education that uses effective communication can thus possibly be used to prevent anaemia in adolescents through an increase in knowledge, with a possible resultant change in their attitudes and behavior[14,15].

Increasing awareness of appropriate nutrition practices and behaviours to improve nutritional status is essential, evidence suggests that these alone will not be sufficient to create lasting changes in behaviours. A social and behaviour-change communication strategy should accompany nutrition-specific interventions aimed at preventing anaemia. These strategies can promote optimal dietary practices and behaviours, and awareness and correct use of iron supplements and/or home fortificants, social and behaviour- change communication strategies have been shown to be effective in increasing consumption of nutrient- rich foods, iron-fortified foods and iron supplements during pregnancy. Social and behaviour-change communication strategies have also been used to increase consumption of animal-source foods, fruits and vegetables, and improve utilization of nutrient supplements among young children[8] .

Therefore, against this backdrop, this study aimed to conduct a systematic review with the specific objective of examining the role of effective

communication in the prevention of aneamia in adolescents through nutritional and dietary changes. To the best of our knowledge, there has been no systematic review with this specific objective, and it is thus a research gap that this study aims to fill. The findings from this systematic review will help to inform discussions, and hence policies, at the global, regional, and national level about the role of effective communication in preventing anaemia in adolescents.

Methods

Data sources, search strategies, and search process

Searches for scientific articles were carried out through five electronic databases, such as Science-direct, PubMed, Sage, ProQuest, and Springer. The article search was carried out starting in August 2023 looking for research articles conducted from 2018 to 2023. Taking articles using a period of 5 years with the consideration that articles with a period of more than 5 years are no longer relevant to current conditions. Some of the keywords used for the literature search included "communication methods to prevent anaemia" and "prevention of anaemia in adolescents".

In order to search for related published literature, first, the title of this systematic review was broken down into searchable keywords by adapting the PICOS framework: participants/population, interventions and comparisons, outcomes, and study design. This is shown in Table 1.

Inclusion and exclusion criteria

The inclusion criteria used in this research include the following: original peer-reviewed articles, articles written in English, and open access articles. Additionally, it must be based on the research topic: Effective communication methods in preventing anaemia in adolescent. Other inclusion criterion are articles published within the selected timeframe, which is 2018 to 2023. Both qualitative and quantitative studies were included in this systematic review. The following papers were however excluded: literature reviews, systematic reviews, or meta-analyses, expert opinions. Additionally, articles that did not concentrate on adolescents were excluded.

Table 1: Population, Intervention, Comparison, Outcomes, and Study (PICOS) framework to structure the review questions

Framework Item	Details
P(population)	Adolescents
I(intervention)	Effective communication strategies
C(comparison)	Not applicable for this study
Outcome	Nutritional/dietary changes, prevention of anaemia
Study type	Cross-sectional study, experimental design, randomised controlled trial.

Data extraction and data synthesis

The first stage of data extraction involved finding duplicates using the title of the articles. Duplicate articles were then removed. Following this, the selected articles were then assessed based on their titles and abstracts. Articles with titles and abstracts that do not fit the inclusion criteria were eliminated. Then, full text reviews of papers that satisfy the inclusion and exclusion criteria were conducted. The following information were then extracted to a Microsoft Excel spreadsheet: the citation information, title, aim of study, methods, results obtained, and conclusions. The data extraction was done by two authors independently, with any disagreements resolved by discussion within the team until consensus was reached.

Study selection

From the 5 online databases searched and following the search strategy detailed above, 3.164 articles were obtained. The number of articles obtained from Science-direct was 885, PubMed was 88, Sage was 673, and ProQuest 1.195, Springer was 324. However, after the removal of duplicates, 2.366 articles were left. With further restriction to articles published from 2018 to 2023, 1553 articles were selected, which was further narrowed down to 179 using the inclusion criterion of open access full text availability. Finally, after full text review, 10 articles were selected for systematic review. Figure 1 shows the details concerning study selection using the PRISMA flow chart.

Bias assessment

Article quality assessments are classified into high, medium and low. High quality means that further

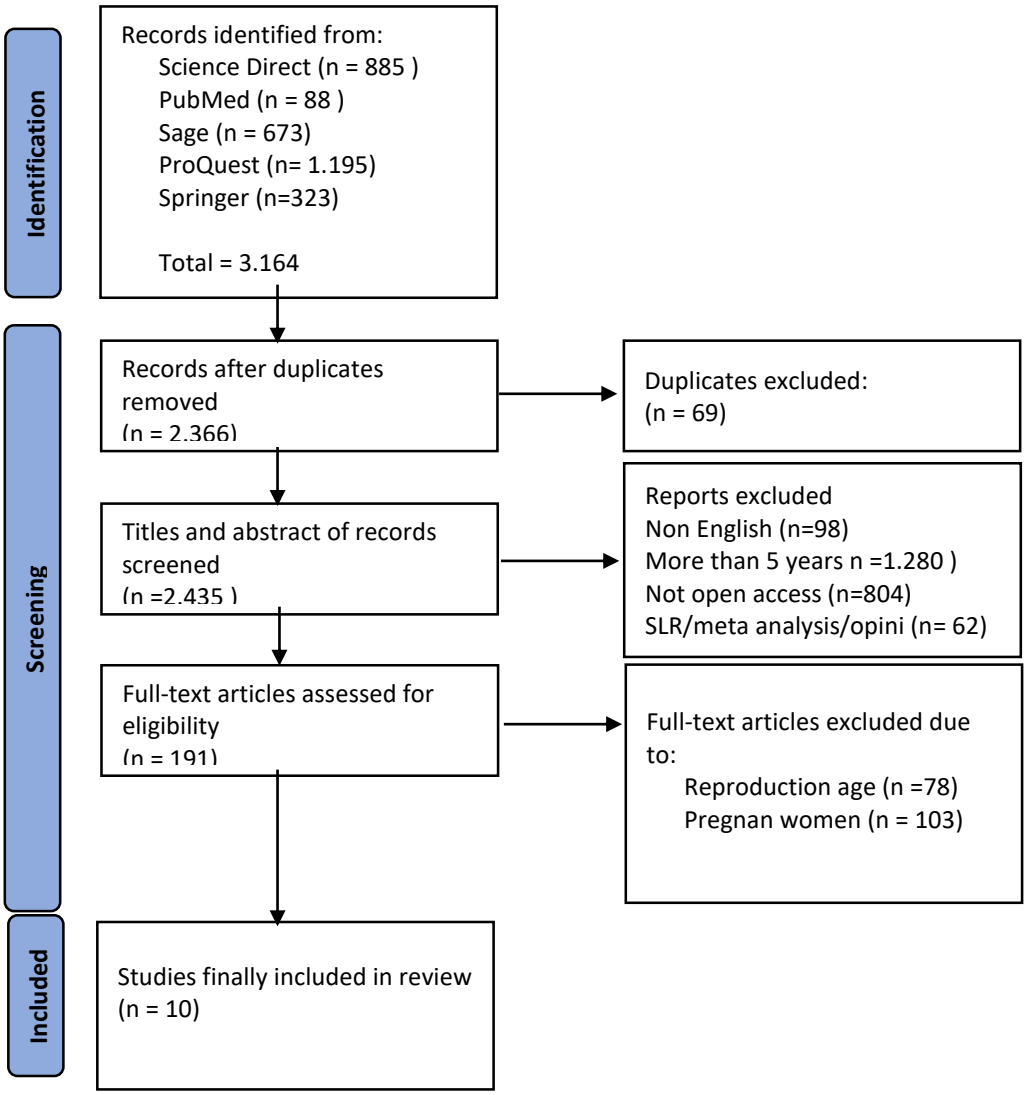

Figure 1: PRISMA flow chart of studies

research is unlikely to change the confidence of the results shown; Medium quality indicates that additional research is likely to have a large impact on the results and Low quality requires further study and will likely have a large impact on confidence in the study results.

Research results are ranked based on eight criteria, namely: research design, description of the intervention carried out, description of the results before and after the intervention, research period, type of analysis, report of results, reporting positive results, and recording limitations/bias. The cumulative quality score of each study was converted into a percentage. A score above 70% is considered high quality, a medium quality score is from 50% to 70%, and a low quality score is below 50%. The quality assessment of the reviewed literature is presented in Table 2.

Risk of bias assessment

The risk of bias assessment on communication method were used as an effective communication method to increase knowledge and change behavior to prevent anaemia in the identified strudies as shown in Table 2

The results of the risk of bias assessment showed that 3 articles were in the high category, 3 articles in the middle category and 4 articles in the low category. Even though 4 articles are in the low

Table 2: Risk of bias assessment on communication method were used as an effective communication to prevent anaemia in adolescent

Reference	Educational intervention	Integrated health care	Awarenes	Nutrition intervention	Media education	Interpersonal communication	Peer effect	Quality include study
Gillespie[16]	√	√	√	√				High
Gao[17]							√	Low
Baker[18]	√	√				√		Moderate
Jeihooni[19]	√	√	√		√	√		High
Gosdin[20]	√	√						Moderate
Puspa Sari[13]	√	√	√			√		High
Aisah[21]	√				√			Low
Wiafie[15]	√							Low
Patimah[22]	√	√				√		Moderate
Puspa Sari[23]					√			Low

category, the research design used is RCT and quasi-experimental, so 3 articles are in the high category.

Results

Study characteristics

Ten studies included were published between 2018 up to 2023. Two were conducted in West Africa and four in South East Asia, one in South Asia, one in East Asia, one in West Asia and one in South West Asia. Six articles were experimental design with Randomizes Control Trial, one of the study was a survey and three studies were qualitative study. The studies were given an intervention hold on one month until two years. This reviewed article includes some different countries such as Indonesia, China, India, Jordan, Ghana and Iran. The measurable outcomes were interpersonal communication, counselling, well planned interactive educational program, interpersonal communication with support by families, health professional and peer group, used of media such as videos and mobile applications. Those outcomes can increased knowledge, attitude, motivation and practice to improved dietary iron to reduce anaemia. The summary of the study was shown at Table 3.

Findings from final selected articles

Educational intervention

Eight articles used health education as a communication method in preventing anaemia. Communication as a health education through providing education, especially regarding nutrition, has a direct impact on changing knowledge in preventing anaemia, especially in adolescents. Such as in Wiafie et al, where nutritional education and counseling for 6 months can increase the intake of iron, ferritin, and hemoglobin in food[15]. Health education about the importance of iron in adolescent health, source of iron-rich foods, iron-enhancing food, iron-inhibiting food, and proper hygiene effective in increasing knowledge, attitudes and behavior in consuming iron tablets. Counseling session lasted for 30 minutes and monitor iron diet sheet by conversation on telephone[15]. Similar to the results of Baker et al, structured educational interventions carried out by WHO guidelines have proven to be effective in increasing knowledge, attitudes, and practices in the prevention of Iron Deficiency Anaemia (IDA) among adolescent girls[18]. Nutrition educational program was devided into four session containing lectures, video and brochures. Health education carried out consistently will directly increase knowledge which will have an impact on changing attitudes and behavior.

Integrated health care

Six studies used integrated health care to prevent anaemia in adolescent. The model of the integrated health care system consists of several essential points, namely policymakers' commitment, governance, quality, adolescent lifestyle, adolescent self factor, access to health services, and social support[13]. Research of Gosdin *et al* showed that the program to reduce anaemia is strengthened by the supply chain, acceptability, and motivated stakeholders; however, training, curricula, clear communication, and incentives could improve its program[20].

Parental support, involvement and education have been highlighted as way to raise

Table 3: Summary of the effective communication methods to prevent anaemia

Author/reference	Country/Region of study	Study Design	Participant	Study Duration	Outcomes	Result Finding	Conclusion
Gillespie, *et al*[16]	India/Karnataka	Qualitative study	female adolescents aged 13 to 19, health care providers, program managers, and school teachers, for a total of 64 in-depth interviews (IDI	5 months	Awareness abaout anemia in adolescent girl	Adolescent girls, particularly those who have not experienced pregnancy or motherhood, had very low awareness of anaemia. State programs including school-based distribution of iron and folic acid supplements and nutrition talks were not seen to be resulting in knowledge and acceptance of the importance of preventing anaemia.	For adolescents to gain improved awareness of anaemia, steps to increase their comprehension of the condition and how it may affect them, including increased detection of anemia, will be required. It is imperative to invest in school-based nutrition education, in cooperation with families, com- munities and the health sector, so that anemia in adolescence becomes a subject of concern, without waiting for pregnancy.
Gao, *et al* [17]	China	survey	11,384 students	-	alternative explanation for children's dietary and nutritional cognition by exploring the peer effect as an important factor.	Peers had a significant impact on the students' dietary and nutritional cognition. The endogeneity problem was solved using peers' parents' dietary and nutritional cognition scores and average educational level as instrumental variables. The impact of peer cognition on diet and nutrition was heterogeneous among different groups. The significance and degree of the peer effect differed based on peer relations, gender, age and school.	Communication with peers had a significant impact on the students' dietary and nutritional cognition
Baker, *et al* [18]	Jordan	Quasy experimental design (pretest-	363 students from four public secondary school	A month	Knowledge, attitude, and practice regarding	44.5% of the sample had mild anaemia, and 10% had moderate anaemia. In terms of knowledge, attitude, and practice, 52.4% exhibited adequate	structured educational intervention effectively improves knowledge, attitude, and practice regarding IDA among adolescent

Author/reference	Country/Region of study	Study Design	Participant	Study Duration	Outcomes	Result Finding	Conclusion
		posttest control group)			iron deficiency anaemia	knowledge, 45% engaged in healthy practices, and 42.7% had a positive attitude toward IDA. The intervention group's total KAP scores were significantly higher than the control group's ($p \leq .05$) post-program. Additionally, the total KAP scores within the intervention group showed a significant increase from pre- to post-test ($p \leq .05$).	females. Health care professionals must not only be oriented about this health problem among this age group, but also be supported to enable their intervention within a school setting
Jeihooni, *et al* [19]	Fasa Cuty, Fars Province, Iran	Quasy Experimental study	160 students (80 experimental, 80 control groups)	4 months	Knowledge, attitude, self efficacy, reinforcing factors, enabling factors, preventiove behavior, and anaemia status	there was no significant difference in the RECEDE constructs, and nutritional behaviors preventing iron deficiency anaemia before the intervention in two groups of study. However, the experimental group significantly increased for 4 months after the intervention. Also, the two groups had no significant difference in the mean score of hemoglobin, hematocrit, and ferritin blood levels before the intervention. However, in the Ferritin level, a significant increase was shown in 4 Months after the intervention in the experiential group	the nutrition intervention education based on the PRECEDE model has a positive effect on improving iron deficiency anaemia preventive behaviors in female students
Gosdin, *et al* [20]	Ghana	Qualitative study	16 district coordinator, 16 head teacher, 16 focal person, 16 teacher, 13 parent leader	A year	GIFTS program	Limited training, challenges during distribution of IFA, lack of incentives, and inconsistent health and nutrition education diminished program fidelity. Strong supply chain, widespread awareness promotion, improved acceptability, and intrinsically motivated educators improved program fidelity.	The fidelity of Ghana's GIFTS program is strengthened by its supply chain, acceptability, and motivated stakeholders; however, training, curricula, clear communication, and incentives could improve it.

Author/reference	Country/Region of study	Study Design	Participant	Study Duration	Outcomes	Result Finding	Conclusion
						After 2 years of implementation, schools had made program adaptations, and widespread changes in attitudes and beliefs about the IFA tablets had improved their acceptability. However, limitations remained related to supply chain, program ownership, communication between health and education sectors, training, motivation, and resources	
Puspa Sari, *et al* [13]	Indonesia	Qualitative research: grounded theory	41 respondent (adolescent girls, teachers, parents, health workers from the public health center, and individuals in charge of adolescent programs from the health office, education office, and the ministry of religion adolescent girls who participated in this study came from 16)schools.	2 months	model of the integrated health care system	This investigation generated twenty-two categories and seven themes. These themes relate to policymaker commitments, stakeholder governance, quality, adolescents' lifestyles, adolescents' self-factors, adolescents' access to health services, and social support. The themes identified become fundamental aspects of the integrated health care system model for preventing IDA in adolescent girls	The model of the integrated health care system consists of several essential points, which include awareness and efforts from policymakers and adolescent girls, supported by parents, teachers, and the community
Aisah, *et al* [21]	Indonesia/Central Java, Semarang City	A quasi-experimental method with a randomised	161 female adolescent devided into intervention	4 weeks	Knowledge about anaemia prevention	The animated educational videos played thrice significantly increased the knowledge of the intervention group (mean score: pre-test, 94; post-test one,	Animated educational videos significantly increased the knowledge of anaemia

Author/reference	Country/Region of study	Study Design	Participant	Study Duration	Outcomes	Result Finding	Conclusion
		pre-test and post-test control group	group (n=78) and control group (n=83)			99; post-test two, 102). The scores for anaemia examination barriers (P=0.001), anaemia susceptibility (P=0.001), anaemia severity (P=0.001), anaemia prevention benefits (P=0.001), anaemia examination benefits (P=0.001), self-efficacy for obtaining iron tablets (P=0.001), self-recognition of anaemia signs and symptoms (P=0.001), signs of anaemia prevention (P=0.001) and health motivation (P=0.001) significantly changed. Meanwhile, the knowledge of the control group did not significantly increase (pre-test, 93; post-test one, 94; post-test two, 97). The intervention group had significantly higher mean scores in both the first and second measurements than the control group (P=0.05).	prevention, including the nine HBM indicators.
Wiafie, *et al*[15]	Ghana/ Asante-Akim South Municipality of Ashanti Region	Randomized Controlled Trial	137 adolescents aged 10-14 years (intervention group = 50, control group=50)	6 months	Nutritional status and anaemia	no statistically significant difference ($p > 0.05$) was observed between the study groups in terms of underweight, haemoglobin, ferritin, and dietary iron intake except for vitamin C intake. However, underweight, haemoglobin, dietary iron, and vitamin C intake mean values increased in all groups except for ferritin. Within the study groups, nutritional parameters were statistically significant ($p < 0.05$) at pre-and post-intervention except for ferritin levels in the intervention group. The prevalence of anaemia, low ferritin levels,	Nutrition education improved dietary iron and vitamin C intake and reduced the prevalence of anaemia in the intervention group

Author/reference	Country/Region of study	Study Design	Participant	Study Duration	Outcomes	Result Finding	Conclusion
						inadequate dietary iron, and vitamin C intake dropped in all groups but greatly reduced in the intervention group	
Patimah, *et al* [22]	Indonesai/Majene	Quasy Experimental study design	342 female adolescent	2 years	nutrition-health knowledge and nutritional status among adolescent girls	There was an increase in the mean value of all aspects of nutrition-health knowledge. This increase was higher in the intervention group. The malnutrition biomarkers decreased significantly in the intervention school comprised of anemia was 3.4%, Chronic Energy Deficiency (CED) was 24.1%, severe stunted at 0.8%, and wasting at 1.6%, but overweight increased by 1.2%. In the comparison school, only CED decreased significantly by 26.2%, while anemia, severe stunting, wasting, and overweight increased significantly.	school-integrated interventions were more effective than nutritional education alone in improving nutrition-health knowledge and nutritional status among adolescent girls
Puspa Sari, *et al*[23]	Indonesia/ Soreang Distric, Bandung Regency	Quasy Eksperimental with a pretest-posttest design	162 adolescent girls were included in the intervention group and 115 adolescent girls in the control group	3 months	adolescents' knowledge and attitude	adolescents' knowledge and attitude increased significantly in three months after the intervention of WANTER and booklets toward preventing anaemia with $p < 0.001$; however, there was no significant difference in KAP between the control and intervention groups.	Adolescents' knowledge increased significantly in three months after the intervention of WANTER and booklets toward preventing anaemia. Knowledge, attitudes, and practices to prevent anaemia need to be continuously improved. Health education through appropriate media for adolescent, by health worker, teachers, parents and stakeholder is very important to make intervention more effective

awareness about anaemia in adolescents[24]. Awareness promotion was a key factor for positive change in attitude and belief surrounding iron and folic acid (IFA) tablets. During the distribution of IFA tablets, some educators spoke informally about the benefits of IFA[20]. Posyandu cadres become one of the community participant who join as an educator to giving knowledge about anaemia prevention. School-integrated interventions were more effective than nutritional education alone in improving nutrition-health knowledge and nutritional status among adolescent girls. Health nutrition education subject for School Based Adolescent Girls are malnutrition, healthy nutritional behaviour for adolescent girls, reproductive health and physical activity[22].

Communication method which held on health education is given in 4 sessions. In the 1st session, knowledge is given about the concept of adolescent anemia, 2nd session discusses the factors that influence anaemia and the impact of adolescent anemia, 3rd session was discusses good diet, and in 4th session discusses proper nutrition, propoer cooking, substitute foods. and solutions to eliminate the wrong habit of taking iron pills in school. A session was held once a week with teachers, school officials, family, staf of a health center[19]. Social support in school beside teachers are peers. The peer's influence on adolescents cognition of diet and nutrition varied by friendship[17].

Media education

Three articles used media as a communication tool for adolescents to prevent anaemia in adolescents The media used are mobile applications, animated videos and booklets. This media is a tool that makes it easier to convey messages, especially to increase knowledge. The uses of educational media that was combined and adapted to adolescents was more effective in increasing knowledge about anaemia prevention. Animated Educational video which played for 10 minutes for 4 weeks were proven to be effective in increasing knowledge, self-efficacy and motivation in preventing anaemia[21]. Mobile applications can help adolescents monitor health, intake nutrition and source of health information. Using mobile health for three months with counseling program online was effective method to communicate with adolescents[23].

Discussion

The high incidence of anaemia encourages the prevention of anaemia, especially among adolescents. One important intervention to prevent anaemia is through health education both in the school and the community. Health education is also one of the breakthroughs that can be developed to overcome the problem of anaemia in adolescents[25]. Awareness of anaemia in schools is very low even though anemia screening and health education have been carried out in schools. This is because adolescents do not care about anaemia before they are pregnant. This requires efforts to increase their awareness about anaemia through school-based interventions and counseling involving families[24].

The improvement of anaemia prevention behavior is influenced by knowledge and attitudes about anaemia prevention. Structured health education interventions can improve knowledge, attitudes and actions in anaemia prevention[18]. Health Education is provided through communication carried out by peer groups, parents, health workers and schools. Family food culture also important to influence the adolecent's food habbit[16]. Health Education is expected to increase adolescent knowledge about anaemia so that it will encourage the formation of behavior to prevent anaemia.

Communication is the exchange of information between communicants and communicator[26]. The effectiveness of communication carried out by adolescents needs to be seen and studied to determine the best communication strategies to be able to invite adolescents to be proactive in preventing anaemia. For example, one of the factors that influences anaemia is BMI, where thin women tend to get anaemia more easily than normal or fat women[27]. Through health communication, it can be conveyed to teenagers that this factor can be controlled by fulfilling nutritional intake that meets balanced nutrition.

The literature study conducted found several communication methods used to reduce anaemia including through interpersonal communication, communication with support by family, peers and health workers, a combination of interpersonal communication, environmental support, communication using media education, well-planned communication strategies with

communication in integrated health care system. From several studies, it was found that well-planned communication strategies with communication in integrated health care system is an effective strategy in increasing knowledge and behavior in preventing anaemia in adolescents. Interpersonal communication is modified and strengthened through the support of family, peers and health workers such as communication by the phone or counseling. Communication carried out with adolescents will be effective if it uses a peer group approach so that communication is easier because the communication actors have the same characteristics[28].

Educational media is one of the important things that influence learning process. Animated educational video confined comprehensive, informative and creative information on anaemia prevention in adolescents. Combination of images and sound is more effective in increasing knowledge and changing adolescent behaviour and also more enjoyable and prevent boredom in health education process[21]. Mobile health application also helps adolescents to increase knowledge about preventing anemia, monitoring iron consumption and online counseling with health workers[23]. Wang, *et al.'s* research showed that cyber counseling is very effective in changing the behavior of adolescents in preventing anaemia, especially on Z generations[29].

Many of the health problems discussed are very difficult for women to overcome without support. It is worth pondering why only women are expected to make these changes. Therefore, the fuller involvement of men in behavior change communication programs as well as government demands to provide quality health services, schools and infrastructure is very important to reduce the number of malnutrition in a sustainable things[30].

Strenght and limitation

This literature review provides an overview about communication method in preventing anaemia in adolescent. This literature review describes several different types of research designs but with the same conclusion that changing behavior to prevent anemia cannot be separated from increasing knowledge through education and support from others. One limitation of this review is restricting our search strategy to five electronic databases using selected keywords and phrases. Some of the articles obtained did not directly shown in communication methods to preventing anaemia in adolescent. The specificity of communication methods for adolescent mostly included on reproductive age.

Conclusion

The literature study conducted found several communication methods used to reduce anaemia including through interpersonal communication, communication with support by family, peers and health workers, a combination of interpersonal communication, environmental support, communication using media education, well-planned communication strategies with communication in integrated health care system. From several studies, it was found that well-planned communication strategies with communication in integrated health care system is an effective strategy in increasing knowledge and behavior in preventing anaemia in adolescents.

Authors contribution

Dessy Lutfiasari: conceptualized and designed the study, wrote original draft preparation
Santi Martini: conceptualized and designed the study, validation
Sri Widati: Supervision, validation
Widati Fatmaningrum: Supervision, review article and editing

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