

The Relationship Between Hemoglobin Levels And Quality of Life (QoL) Among Adolescent Girls in The Working Area of Tengah 1 Singkawang Public Health Center

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Abstract

Anemia is becoming more common among teenage girls worldwide, including in Indonesia. Complications like chronic stress and exhaustion, which can result in weakness, dizziness, blurred vision, and a pale face, are among the clinical signs that can arise when the Hb level falls below the normal range. A person's perception of their place in daily life in relation to the culture and values of their community, as well as their own objectives, expectations, desires, and concerns, is known as their quality of life (QoL). The purpose of this study is to ascertain the connection between adolescent girls' quality of life and hemoglobin levels in the Singkawang Tengah 1 Public Health Center working area. This study combines analytical quantitative research with descriptive-correlational research. This study is cross-sectional, descriptive-correlational, and of the analytical quantitative research type. This study's sample was drawn from the entire population of 110 respondents using total sampling. The WHOQOL-BREF questionnaire and an HB meter for measuring hemoglobin levels were the tools used in this investigation. The chi-square test was used to analyze the data. The study's findings show that hemoglobin levels and teenage girls' quality of life are significantly correlated ($p < 0.05$), with a value of 0.000. The quality of life of teenage girls is found to be correlated with hemoglobin levels.

Keywords: Adolescent Girls; Anemia; Hemoglobin Level; Quality of Life;

Introduction

Hemoglobin is a metaloprotein, or a protein composed of red blood cells that serves as a transporter of oxygen from the circulatory system to the rest of the body. Anemia is diagnosed when the Hb level is less than 12 g/dl in women, or lower than 13 g/dl in men. Periodic irregularity, poor diet, and a lack of knowledge about anemia are the leading causes of anemia in women [1-2].

Currently, it is estimated that 30% of the world's population suffers from anemia. According to a survey conducted by the World Health Organization (WHO) in 2019, the global prevalence of anemia among adolescents between 10-19 years ranges from 44-88%, which means the global prevalence of anemia was 1.74 billion in 2019. [3-4]. According to the WHO, Quality of Life (QoL) is an individual's perception of how they are treated in daily life, in accordance with the values and culture of their place of residence, as well as their own goals, expectations, desires, and concerns. Preventing anemia in women of childbearing age is one of the most important factors in improving women's health, child health, school performance, women's work productivity, more favorable pregnancy outcomes, and intergenerational benefits for good health, economy, and community development [6].

Anemia in adolescents will impact physical, psychological, and emotional growth. This can affect brain cells in their growth and development process, leading to decreased immunity, easy fatigue and hunger, and impaired learning concentration [7]. Female adolescents are ten times more probable to experience anemia compared to male adolescents, which is caused by menstruation that female adolescents experience every month [8].

Based on the data showing a still high prevalence of anemia in the region, while there lacks available data on the relationship between hemoglobin levels and quality of life in adolescent girls. Therefore, this study was carried out to analyze the relationship between hemoglobin levels and quality of life in adolescent girls, aiming to prevent the prevalence of anemia from an early stage, starting from adolescence, and to provide a greater understanding and basis for more effective health interventions [10].

Method

1. Research design

The research design was descriptive correlational with analytical quantitative research type and cross-sectional approach, which is to determine the relationship between hemoglobin levels and quality of life among adolescent girls within a single observation period.

2. Setting and samples

This research was conducted at Madrasah Aliyah Asy-Syafi'iyah Singkawang. The study population was composed of female adolescents at MA Asy-Syafi'iyah Singkawang, totaling 110 individuals within 4 classes. The sample in this study used total sampling, which means taking the entire sample from the total population. Therefore, in this study, the sample taken was 110 respondents. Exclusion criteria include female students who were absent on the day of the study, suffered from chronic diseases, had a history of bleeding, experienced menstrual disorders, or were taking iron supplements in the last month.

3. Measurement and data collection

In this study, the questionnaire used was the WHOQOL-BREF to measure the quality of life of adolescents, and hemoglobin levels were measured with an HB meter. The quality of life questionnaire contained 26 questions that respondents answered about how they were doing in the past four weeks. The measurement results using the WHOQOL-BREF questionnaire can be categorized on a scale of 0-100, where according to research, this scale was categorized as Low (≤ 55), Moderate (56-79), and High (80-100).

4. Data analysis;

Data analysis was carried out using the Statistical Package for the Social Sciences (SPSS) software. Descriptive statistical analysis was used to analyze the characteristics of the respondents and their distribution of scores. An inferential analysis was performed using the Chi-Square test to analyze the relationship between hemoglobin levels and quality of life. The level of statistical significance was set at $p < 0.05$.

Results

This research was conducted in December 2025 at MA Asy-Syafi'iyah in Singkawang

City. The total number of respondents in this study was 110 people who have participated in this research, as determined by the researcher based on the following characteristics:

Table 1. Characteristic by Age

Age	Frequency	Percent	Valid Percent	Cumulative Percent
15	30	27.0	27.3	27.3
16	53	47.7	48.2	75.5
17	27	24.3	24.5	100.0
Total	110	99.1	100.0	

Based on Table 1, the results of the frequency distribution of respondents' ages are as follows: 15 years old, 27.3% or 30 respondents; 16 years old, almost half of the respondents, 48.2% or 53 respondents; and 17 years old, 24.5% or 27 respondents.

Table 2. Distribution of Hemoglobin Level and Quality of Life

Variable	Category	Frequency	Percent	Valid Percent	Cumulative Percent
Hemoglobin Level	Anemia	60	54.5	54.5	54.5
	Normal	50	45.5	45.5	100.0
	Total	110	100.0	100.0	
Quality of Life	Low	32	29.1	29.1	29.1
	Moderate	48	43.6	43.6	72.7
	High	30	27.3	27.3	100.0
	Total	110	100.0	100.0	

In Table 2, the results of the respondents' hemoglobin levels distribution show that the majority of respondents are anemic, accounting for 54.5% or 60 respondents. The results of the respondents' quality of life distribution showed that the majority of respondents had a moderate quality of life, which was 43.6% or 48 respondents.

Table 3. Chi Square Test

Variable	Low		Moderate		High		Total		<i>P</i> <i>value</i>
	n	%	n	%	n	%	n	%	
Anemia	32	53,3	28	46,7	0	0	60	100	0,000
Normal	0	0	20	40	30	60	50	100	
Total	32	29,1	48	43,6	30	27,3	110	100	

Based on Table 3, the results of the relationship between hemoglobin levels and quality of life among adolescent girls, used Chi-Square test, p-value was 0.000 (<0.005). This indicates relationship between hemoglobin levels and the quality of life among adolescent girls, measure used the WHOQOL-Breef questionnaire. The SPSS data processed show that the highest percentage of respondents with low hemoglobin levels (anemia) have a low quality of life, at 53.3% or 32 respondents, while the highest percentage of non-anemic respondents have a high quality of life, at 60% or 30 respondents.

Discussion

The results showed that the relationship between hemoglobin (Hb) levels and quality of life among adolescent girls. This was evidenced by the statistical test results used the Chi-Square test, which showed a p-value of 0.000, which is less than 0.05. Therefore, the relationship was statistically significant. This indicated that hemoglobin levels are an important factor influencing the quality of life among adolescent girls. Low Hb levels can impact physical capacity, concentration, and psychological well-being, ultimately affecting an individual's perception of their overall quality of life. Low hemoglobin levels can lead to health problems such as fatigue, decreased concentration, and reduced immunity. This can potentially lower quality of life, which includes physical, psychological, social well-being, and the ability to perform daily activities. Low hemoglobin levels can lead to anemia, which limits oxygen transport in the blood. This can result in reduced physical and mental activity capacity and other health risks. Nutritional intake that can lead to reduced hemoglobin levels is related to quality of life, as revealed thru research.

The results of this study were in line with a number of earlier studies that claimed

anemia was related to a reduction in life quality. The results presented suggest that anemia is health issue that impacts teenagers' emotional and physical health. However, the strength of the relationship observed in each study could differ based on respondent characteristics, quality of life instruments, and statistical analysis methods. A person's perception of their place in daily life in regards to the culture and values of their community, as well as their own objectives, expectations, desires, and concerns, determine their quality of life. One of the most important factors in enhancing women's health, children's health, school performance, women's work productivity, healthier pregnancy outcomes, and intergenerational benefits for overall well-being, the economy, and community development is preventing anemia among women of childbearing age. To reduce and overcome anemia, a variety of interventions are necessary. Additionally, families, educators, and medical professionals perform critical roles in encouraging adolescents to maintain healthy lifestyles. Comprehensive interventions aim to improve adolescents' holistic physical and mental health in addition to raising hemoglobin levels.

Limitation

Some limitations need to be considered when interpreting the results of this study. This study has several limitations, including its cross-sectional research design, which prevents it from definitively explaining cause-and-effect relationships. Additionally, quality of life is measured based on respondents' subjective perceptions, which allows for response bias. However, the results of this study still provide a meaningful picture of the relationship between Hb levels and the quality of life of adolescent girls.

Conclusion

This study showed that there is a relationship between Hb levels and the quality of life among adolescent girls, with a p-value of 0.000 ($p\text{-value} < 0.05$). There were 54.5% or 60 respondents who were anemic and 45.5% or 50 respondents who were not anemic. The results showed that the highest percentage of low quality of life was among respondents with low hemoglobin levels (anemia), at 29.1% or 32 respondents, while the highest percentage of high quality of life was among respondents who were not anemic, at 27.3% or 30 respondents.

Ethical Considerations

The principles of health research ethics, which include beneficence, justice, and respect for individual rights, were followed in the conduct of this study. Every respondent was given an in-depth description of the goals, methods, and possible advantages of the study. All respondents submitted written informed consent, and participation was completely voluntary with no repercussions. By employing data codes and excluding personal identities, respondents' confidentiality and anonymity are preserved. With ethics number 109/e-KEPK/FIKES/XI/2025, this study has been approved by the Ethics Committee for Health Research of the Faculty of Health Sciences, Universitas Nasional.

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Conflict of Interest

The author states that there are no conflicts of interest in the conduct or publication of this research.

Author contribution

Ria Anggreni contributed to the preparation of the manuscript, data collection, data analysis, and research concept and design. Febry Mutiariami Dahlan and Putri Azzahroh helped with data interpretation, critical manuscript revision, and final manuscript approval. The paper was translated and revised by Febry Mutiariami Dahlan. Each author is responsible for each aspect of the research and has read and approved the final manuscript.

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