

THE RELATIONSHIP BETWEEN KNOWLEDGE OF EATING AND SLEEPING PATTERNS AND THE INCIDENCE OF ANEMIA AND LEARNING ACHIEVEMENT

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Abstract

Anemia is a condition in which the body experiences a decrease in the number of red blood cells, which falls below the normal range. This occurs due to a lack of hemoglobin (iron-rich protein), which affects the production of red blood cells. A deficiency in red blood cells causes fatigue and memory problems, which in students can affect their concentration while studying. Over the last three years, the incidence of anemia at MA S Ibnu Abbas school has consistently increased. Therefore, the purpose of this study is to determine the relationship between eating patterns, sleeping patterns, the occurrence of anemia, and academic achievement at MA S Ibnu Abbas Pulo Panjang. The research method used is quantitative with a cross-sectional approach. The population and sample used were 71 students of MA S Ibnu Abbas. Data analysis techniques included univariate and bivariate analysis (Chi-square). The results showed a significant relationship between eating patterns and sleeping patterns with the occurrence of anemia. There was also a significant relationship between eating patterns, sleeping patterns, and academic achievement. Furthermore, a significant relationship was found between the occurrence of anemia and academic achievement. It can be concluded that the occurrence of anemia at MA S Ibnu Abbas is influenced by eating and sleeping patterns, which also affect the students' academic performance.

Keywords: Anemia, academic achievement, eating patterns, sleeping patterns

INTRODUCTION

Anemia is a health problem that impacts productivity by causing fatigue, tiredness, weakness, and lethargy. The prevalence of anemia in Indonesia remains high, even potentially reducing the quality of future generations (Ministry of Health of the Republic of Indonesia, 2021). The WHO (2011) defines anemia as a condition where the body lacks hemoglobin (Hb), a component of red blood cells that transports oxygen. This condition can occur in all age groups, including adolescents, with a prevalence of 32% in those aged 15–24 years according to the Basic Health Research (Riskesdas) (2018).

Adolescence is a transitional period from childhood to adulthood, spanning the ages of 10–22 (Santrock, 2007). Healthy adolescents are a national asset, especially in the lead-up to the 2030 demographic bonus, which demands a productive and competitive generation. However, anemia remains a common problem for adolescents, particularly girls, with iron deficiency primarily caused by menstruation, an unbalanced diet, or certain health conditions. The impact is not only physical but also affects cognitive function and concentration. In addition to menstruation, adolescent lifestyle also influences the risk of anemia. Adolescent girls are vulnerable due to an unbalanced diet to maintain body image, while adolescent boys are

vulnerable due to poor sleep patterns. Quality sleep is crucial because the body produces hormones during the NREM phase for cell regeneration and blood formation (Jackowska et al., 2015). Disturbed sleep and eating patterns, including those caused by internet use and online gaming, can impact academic performance (Aulia, 2020).

This situation also occurred at MA Ibnu Abbas Pulo Panjang, Serang. Based on hemoglobin (Hb) testing, the prevalence of anemia at this school reached 31% in 2021, up from 28% in 2019. The school is supported by the local community health center (Puskesmas) and offers routine health programs such as weight-bearing, iron supplementation (TTD), and hemoglobin testing. The high anemia rate is feared to impact student achievement. This prompted a study titled "The Relationship between Diet and Sleep Patterns and Anemia Incidence and Achievement."

Studying Students at Ibnu Abbas Pulo Panjang Islamic Senior High School in 2023". This research refers to several previous studies related to the relationship between diet, sleep patterns, anemia, and academic achievement. For example, Indah Gayatri (2020) found that poor sleep quality is associated with anemia, while Afriani Rahmadania (2021) showed a link between diet and menstruation with anemia in adolescents. Other studies have also shown a relationship between diet or sleep patterns and academic achievement. However, this study differs because it not only focuses on adolescent girls but also involves adolescent boys at Ibnu Abbas Islamic Senior High School.

The urgency of this research lies in the increasing cases of anemia due to changes in adolescent lifestyles influenced by technological advancements. Addiction to gadgets and online games tends to lead adolescents to neglect their diet and sleep patterns, which impacts their health and academic performance. Therefore, this research is crucial to provide students with an understanding of the impacts of poor lifestyle habits and to encourage anemia prevention efforts so that adolescents can grow up healthy, intelligent, and productive.

RESEARCH METHODS

This study uses an associative research method that aims to identify the relationship between two or more variables (Sugiyono, 2012). This type of research is considered the highest level because it can build theories for clarity, prediction, and control of phenomena compared to descriptive and comparative research. The quantitative approach used in this study, which is based on positive philosophy, means it is used to confirm or test hypotheses through statistical analysis. The method used is observational quantitative research with a cross-sectional approach, meaning data is collected at a specific point in time without continuation. Data collection involves information from independent and dependent variables.

This research was conducted at MAS Ibnu Abbas, located in Pulo Panjang, Pulo Ampel District, Serang Regency. The location was chosen because there had been no similar research at this school, and the number of male students was higher than that of female students. The lifestyle patterns of adolescents at this school were influenced by the rapid development of online games, which impacted irregular sleep and eating patterns, thereby increasing the risk of health problems, especially anemia. This research was conducted for three months, from November 2022 to January 2023, with the aim of providing sufficient time for systematic data collection, analysis, and reporting. The population in this study were all students from grades X to XII, totaling 71 students. The sampling technique used was total sampling, so due to the relatively

small population, all 71 students were sampled. The data sources used were primary data in the form of questionnaires, hemoglobin level checks, and academic records, as well as secondary data in the form of school documentation. The variables studied included independent variables (eating patterns and sleep patterns) and dependent variables (the incidence of anemia and academic achievement), which were measured through operational definitions using various instruments. Data analysis was conducted using SPSS with univariate and bivariate analysis, including the chi-square test to test the relationship between existing variables.

RESULTS AND DISCUSSION

Overview of Research Object

Ibnu Abbas High School Profile

MAS Ibnu Abbas Pulo Panjang is a high school located in Pulo Ampel District, Serang Regency, Banten. MAS Ibnu Abbas Pulo Panjang is under the auspices of the Ministry of Religious Affairs.

Research result

Univariate Analysis Results

Respondent Characteristics Based on Gender

The gender characteristics of respondents at MA S Ibnu Abbas Pulo Panjang are as follows:

Table 1. Frequency distribution of respondents by gender

Gender	N	%
Man	42	59.2
Woman	29	40.8
Total	71	100.0

Based on the table above, it can be seen that the majority of students at MA S Ibnu Abbas Pulo Panjang are male, namely 42 people (59.2%), while a small proportion are female, namely 29 people (40.8%).

Respondent Characteristics Based on Age

The age characteristics of respondents at MA S Ibnu Abbas Pulo Panjang are as follows:

Table 2. Frequency distribution of respondents based on age

Age	N	%
16 years	25	35.2
17 years	20	28.2
18 years	26	36.6
Total	71	100.0

Based on the table above , it can be seen that 25 students (36.2%) at MA S Ibnu Abbas Pulo Panjang are 16 years old, 20 students (28.2%) are 17 years old, and 26 students (36.6%) are 18 years old.

Respondent Characteristics Based on Class

The characteristics of the respondent class at MA S Ibnu Abbas Pulo Panjang are as follows:

Table 3. Frequency distribution of respondents by class

Class	N	%
X	25	35.2
XI	20	28.2
XII	26	36.6
Total	71	100.0

Based on the table above, it can be seen that there are 25 students in class X at MA S Ibnu Abbas Pulo Panjang (36.2%), 20 students in class XI (28.2%), and 26 students in class XII (36.6%).

Anemia Incident

The frequency of respondents regarding the incidence of anemia at MA S Ibnu Abbas Pulo Panjang is as follows;

Table 4. Frequency of Respondents with Anemia Incidents

Anemia Incident	N	%
Yes	29	40.8
No	42	59.2
Total	71	100.0

Based on the table above , it can be seen that 29 students at MA S Ibnu Abbas Pulo Panjang (40.8%) have anemia and 42 other students (59.2%) do not have anemia.

Learning achievement

The frequency of respondents' learning achievements at MA S Ibnu Abbas Pulo Panjang is as follows;

Table 5. Respondents' Learning Achievement

Learning achievement	N	%
Enough	26	36.6
Good	45	63.4
Total	71	100.0

Based on the table above , it can be seen that 26 students (36.6%) at MA S Ibnu Abbas Pulo Panjang have sufficient learning achievement and 45 students (63.4%) have good learning achievement. Therefore, the majority of students' achievements at MA S Ibnu Abbas Pulo Panjang are in the good learning achievement category.

Bivariate Analysis Results

In this study, a bivariate analysis was conducted to determine whether there was a relationship between variables X (dietary patterns and sleep patterns) and Y (the incidence of anemia and learning achievement) in students at MA S Ibnu Abbas Pulo Panjang.

The Relationship Between Diet and the Incidence of Anemia

Table 6. Relationship between Diet and the Incidence of Anemia

Dietary habit	Anemia Incident				Total		P-Value	OR
	YES		No					
	n	%	n	%	n	%	0.0 01	6.00
Irregular	18	66.7	9	33.3	27	100		
Regular	11	25.0	33	7 5.0	44	100		

The table above shows that of the 27 students with irregular eating patterns, 18 (66.7%) were anemic. Of the 44 students with regular eating patterns, 33 (77%) were not anemic. A P-value of 0.001 was obtained, meaning there was a significant relationship between eating patterns and the incidence of anemia with an OR of 6.00, meaning that students who had irregular eating patterns had a 6-fold greater chance of experiencing anemia compared to students who had regular eating patterns.

The Relationship Between Sleep Patterns and the Incidence of Anemia

Table 7. Relationship between Sleep Patterns and the Incidence of Anemia

Sleep Patterns	Anemia Incident				Total		P-Value	OR
	YES		No					
	n	%	n	%	n	%	0.0 03	4,750
Irregular	19	61.3	12	38.7	31	100		
Regular	10	25.0	30	7 5.0	40	100		

Based on the table above , the results show that of the 31 students with irregular sleep patterns, the majority, 19 students (61.3%) had anemia, and of the 40 students with regular sleep patterns, the majority, 30 students (75%) did not have anemia.

The P-value obtained was 0.003, meaning that there is a significant relationship between sleep patterns and the incidence of anemia with an OR of 4.7, meaning that students with irregular

sleep patterns will have a 4 times greater chance of experiencing anemia compared to students who have regular sleep patterns.

The Relationship Between Diet and Academic Achievement

Table 8. Relationship between Diet and Academic Achievement

Dietary habit	Learning achievement				Total		P-Value	OR
	Enough		Good					
	n	%	n	%	n	%	0.0 00	9,000
Irregular	18	66.7	9	33.3	27	100		
Regular	8	18.2	36	81.8	44	100		

The table above shows that of the 27 students with irregular eating patterns, 18 (66.7%) achieved adequate performance. Meanwhile, of the 44 students with regular eating patterns, 36 (75%) achieved good performance.

The P-value obtained was 0.000, meaning that there is a significant relationship between eating patterns and academic achievement with an OR of 9, which means that students with irregular eating patterns are 9 times more likely to have adequate academic achievement compared to students who have regular eating patterns.

The Relationship Between Sleep Patterns and Academic Achievement

Table 9. Relationship between Sleep Patterns and Academic Achievement

Sleep Patterns	Learning achievement				Total		P-Value	OR
	Enough		Good					
	n	%	n	%	n	%	0.0 01	5,538
Irregular	18	58.1	13	41.9	31	100		
Regular	8	20	32	80	40	100		

Based on the table above, the results show that of the 31 students with irregular sleep patterns, 18 (58.1%) had adequate academic achievement. Meanwhile, of the 40 students with regular sleep patterns, 32 (80%) had good academic achievement. A P-value of 0.001 indicates a significant relationship between sleep patterns and academic achievement. An OR of 5 indicates that students with irregular sleep patterns are five times more likely to achieve only moderate academic achievement than students with regular sleep patterns.

The Relationship between Anemia and Academic Achievement

Table 10. Relationship between Anemia Incidence and Academic Achievement

Anemia Incident	Learning achievement				Total		P-Value	OR
	Enough		Good					
	n	%	n	%	n	%	0.0 00	9.5
Yes	19	66.5	10	34.5	29	100		
No	7	16.7	36	83.3	42	100		

Based on the table above , the results show that of the 29 students with anemia, 19 (66.5%) had fair achievement. Meanwhile, of the 42 students without anemia, 36 (83.3%) had good achievement. A P-value of 0.000 indicates a significant relationship between anemia and academic achievement. An OR of 9.5 indicates that students with anemia are 9.5 times more likely to achieve adequate academic achievement than those without anemia.

Discussion of Research Results

Anemia Incident

Anemia is a health problem that requires special attention in all age groups. Anemia is a condition characterized by low red blood cell circulation (Almatsier et al., 2011). Anemia is indicated by hemoglobin (Hb), which is considered anemic if Hb is <12 g/dL. Adriani (2011) states that anemia can occur during menstruation and bleeding.

The Relationship Between Diet and the Incidence of Anemia

The results of statistical tests showed a correlation between dietary patterns and the incidence of anemia at MA s Ibnu Abbas, as evidenced by a P-value of 0.001. A good diet will prevent the risk of anemia. Diet or food consumption is a repetitive activity carried out by each person to meet their needs. Food components are divided into type, frequency, and quantity (Sulistyoningsih, 2011). The formation of erythrocytes is influenced by good food quality, which in turn affects Hb levels.

Research by Abil (2018) explains that adolescent growth will be stunted by poor eating habits. This aligns with Andiri's (2017) theory, which states that today's adolescents are prone to unhealthy eating habits. A good eating pattern is three times a day, but this contradicts Abil's (2018) research, which found that half of the respondents (50%) skipped dinner or breakfast. This eating pattern will certainly impact health and lower hemoglobin levels, which can trigger anemia.

The Relationship Between Sleep Patterns and the Incidence of Anemia

The results of statistical tests conducted showed that sleep patterns were related to the incidence of anemia in students of MA S Ibnu Abbas, as evidenced by a P value of 0.003. Good sleep patterns will prevent the possibility of anemia. Sleep is necessary for humans to repair and form new cells, and provide an opportunity for body organs to rest (Liu, 2015). The body's biological processes will be disrupted if humans experience sleep deprivation, such as lowering Hb levels (Karjono, 2017). Perry & Potter (2015) stated that psychological conditions such as stress can trigger sleep disorders. Jackowska et al. (2015) stated that sleep depth also needs to be considered in addition to attention to duration and quality. Deep sleep occurs in phases 3 and 4 NREM, where repair occurs in body cells and blood. This phase lasts for 100 minutes. Therefore, even if the duration and quality of sleep are good but not deep, it is possible for anemia to occur. In line with research by Indah (2020) which stated that the group of students with anemia had >30% poor sleep quality, namely short nighttime sleep duration, so that sleep quality is linked to the occurrence of anemia.

The Relationship Between Diet and Academic Achievement

The results of statistical tests show that there is a relationship between eating patterns and student learning achievement at MA S Ibnu Abbas, as evidenced by a P value of 0.000. A good eating pattern will increase the opportunity for learning achievement. This is in line with research by Lalu & Lina (2019) which states that there is a close relationship between eating patterns and learning achievement, because adequate nutrition will affect student learning achievement.

Another study by Alqahtani (2020) also found a strong link between students' dietary patterns and academic achievement. This research emphasized the importance of balanced nutrition in increasing school productivity. Children's dietary patterns are influenced by several factors, including gender, activity level, parental knowledge, and family income. Surijati (2021) noted that children's activities at home and at school require high energy levels.

Malnutrition in children can lead to fatigue, poor concentration, and poor memory. Long-term effects include *stunting* due to chronic malnutrition (Siregar, 2016). For optimal growth, children must be provided with a balanced diet. Schmidt (2014) states that children need a diverse diet for optimal brain development. Iron is an equally important nutrient for metabolism. Good academic performance is expected to arise from good nutrition (Hamsah, 2020).

The Relationship Between Sleep Patterns and Academic Achievement

The results of statistical tests indicate a relationship between sleep patterns and student academic achievement at MA S Ibnu Abbas with a P-value of 0.001. Good sleep patterns will increase the chances of good academic achievement. Sleep patterns are indirectly related to academic achievement. A lack of sleep in children will impact their activities. For example, children become easily sleepy while studying, which reduces their absorption of knowledge and affects their grade point average. This is also indicated by children's difficulties when working on exams or tests, resulting in lower grades. In contrast, children who get enough sleep will optimally absorb material and achieve expected grades.

This is in line with research by Mander & Walker (2014), which states that many people ignore sleep patterns, even though our bodies need adequate sleep for tissue development. Sleep plays a vital role in brain development, including improving brain function, enhancing memory and learning behavior, and aiding in processing information received by the brain. The ideal sleep time is 10 hours. Lack of sleep will disrupt brain concentration. Children will have difficulty concentrating if they become drowsy while learning. If left untreated, this can lead to forgetfulness and difficulty with exam questions. These factors can reduce a child's ability to concentrate and lower their academic performance.

The Relationship between Anemia and Academic Achievement

Research shows that anemia is associated with student achievement at MA S Ibnu Abbas, with a P-value of 0.000. Students without anemia are more likely to achieve good academic performance. The effects of anemia include fatigue, decreased concentration, and decreased student productivity. Furthermore, memory problems are often experienced in patients with anemia (Mansjoer, 2000).

Sediaoetama (2014) stated that decreased concentration occurs in children with anemia. Iron deficiency in children will disrupt their learning process. Clear evidence in children with iron deficiency anemia is decreased intellectual ability (Gibney et al., 2013). This can also lead to decreased concentration, decreased learning ability, and lower psychological test scores. Apathy and irritability are also frequently exhibited by children with iron deficiency anemia (Almatsier, 2013).

In line with research by Jenny et al. (2020) which stated that anemia was significantly related to the learning achievement of students at Kelila State Middle School, Central Mamberamo Regency, as evidenced by the P value of 0.000 in the *chi-square* statistical test .

CONCLUSION AND SUGGESTIONS

The following are the conclusions that researchers have drawn based on the results of the research that has been conducted:

- (1) A total of 71 female students at MA S Ibnu Abbas, some of whom suffer from anemia.
- (2) A small number of 71 samples at MA S Ibnu Abbas had adequate learning achievements.
- (3) There is a significant relationship between dietary patterns and the incidence of anemia in female students at MA S Ibnu Abbas.
- (4) There is a significant relationship between sleep patterns and the incidence of anemia in female students at MA S Ibnu Abbas.
- (5) There is a significant relationship between eating patterns and the academic achievement of female students at MA S Ibnu Abbas.
- (6) There is a significant relationship between sleep patterns and student learning achievement at MA S Ibnu Abbas.
- (7) There is a significant relationship between the incidence of anemia and the academic achievement of female students at MA S Ibnu Abbas.

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