INDOGENIUS

ISSN 2828-1365

Volume 4, Issue 3 : 596 – 601

Overview of Hemoglobin and Hematocrit Levels in Stunted Toddlers in the Kajen 1 Community Health Center Working Area

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Article Info

Keywords :
Hemoglobin, Hematocrit, Stunted Children

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ABSTRACT

Background & Objectives: Stunting is a condition in which a child's growth and development are disrupted due to prolonged malnutrition. Children who experience stunting are 2.7 times more likely to develop anemia. Common characteristics of anemia include decreased hemoglobin levels and decreased hematocrit (Ht) values. Malnutrition accompanied by anemia can lead to growth disorders, reduced cognitive and psychomotor function, and decreased immunity in children. This study aims to determine the hemoglobin and hematocrit levels in stunted toddlers in the working area of the Kajen 1 Community Health Center. **Method:** The type of research used was descriptive research, with sampling conducted using total purposive sampling. From a population of 27 toddlers, 18 samples of toddlers who met the inclusion and exclusion criteria were taken. **Result:** The results of hemoglobin level tests using the POCT method and hematocrit tests using the microhematocrit method showed hemoglobin levels above 11.0 g/dl in 100% of cases, normal hematocrit levels in 10 toddlers (56%), and low hematocrit levels in 8 toddlers (44%). with the lowest hematocrit level being 31% and the highest being 39%. **Conclusion:** Hemoglobin levels in stunted toddlers in the Kajen 1 Community Health Center working area were all normal above 11.0 g/dl, hematocrit levels were normal in 10 toddlers, and hematocrit levels were low in 8 toddlers.

DOI: https://doi.org/10.56359/igj.v4i3.626

Introduction

Stunting is a condition in which a child's growth and development are disrupted due to prolonged malnutrition. A child is defined as stunted if their height for age (HFA) is below minus 2 standard deviations (SD) from the median standard growth

for children according to the WHO (Organization, 2015). Stunting is often caused by chronic malnutrition (nutritional deficiency), including iron deficiency. Cognitive decline can occur due to anemia caused by iron deficiency, which results in decreased erythrocyte production. Children who experience stunting are 2.7 times more likely to develop anemia (Hasnawati S, 2024).

Anemia causes a decrease in oxygen delivery to body tissues. Common characteristics of anemia are a decrease in hemoglobin levels and a decrease in hematocrit (Ht) values. Hemoglobin is an important component of red blood cells, consisting of heme and globin. Hemoglobin plays a major role in transporting O2 from the lungs to all tissues in the body, as well as transporting CO2 from body tissues to the lungs to be exhaled. The formation of heme compounds can proceed normally if Fe availability is also fulfilled. Hematocrit (Ht) is defined as the ratio of red blood cells to total blood volume, calculated as a percentage. A below-normal Ht value indicates a decrease in the number of red blood cells or an increase in plasma volume. Below-normal Ht values are commonly found in conditions such as anemia, chronic infections, and disorders of white blood cells, such as leukemia and lymphoma (Dosen TLM Indonesia, 2020).

Malnutrition accompanied by anemia can lead to growth disorders, reduced cognitive and psychomotor functions, and decreased immunity in children. Indonesia faces health and social problems, namely low nutritional status in the community. This is reviewed from various aspects of nutritional problems, such as malnutrition, iron deficiency anemia, iodine deficiency disorders, and vitamin A deficiency. The quality of human resources can be influenced by the nutritional status of the community. Therefore, nutritional status affects intelligence, the immune system in fighting disease, infant mortality, maternal mortality, and productivity at work (Nabila Hurulaini Nurrahman, 2020).

Based on previous research conducted by (Rizki Handayani, 2023), there is a difference in hemoglobin levels between stunted and non-stunted children. The hemoglobin levels in stunted children were found to be lower than those in children who were not stunted. However, another study conducted by (Hestiasih Nirwanto, 2022) states that there is no significant relationship between hemoglobin levels and the growth of stunted toddlers. In this study, all stunted toddler samples had normal hemoglobin levels. Research on hematocrit levels conducted by (Hana Anindya Chairunnisa, 2024) showed that of the 35 stunted children examined, 22 had abnormal hematocrit values. The prevalence of stunted children with abnormal hematocrit values was higher than those with normal values.

Based on the above description, the author is interested in conducting research on the Description of Hemoglobin and Hematocrit Levels in Stunted Toddlers in Kajen District, Pekalongan Regency.

Objectives

This study aims to determine the hemoglobin and hematocrit levels in stunted toddlers in the working area of the Kajen 1 Community Health Center.

Metode

This research is a descriptive study with a population of children under five (1–5 years old) experiencing stunting in the working area of Puskesmas Kajen 1, totaling 27 children. Sampling was carried out using purposive total sampling, resulting in 18 children who met the inclusion criteria: under five years old, experiencing growth disorders (stunting), and having parents who agreed to participate. Exclusion criteria included illness, insufficient blood samples, death, or moving residence. The study was conducted from September 2024 to February 2025. Hemoglobin levels were measured directly at Puskesmas Kajen 1 using POCT, while hematocrit levels were tested at the Laboratory of the Academy of Health Analysts Pekalongan using the microhematocrit method. Capillary blood samples were collected, placed into hematocrit capillary tubes, centrifuged, and read using a hematocrit reader.

The study used both primary and secondary data. Primary data were obtained through observation and laboratory examinations of hemoglobin and hematocrit levels in stunted children, while secondary data came from Puskesmas Kajen 1 records and supporting literature such as journals, textbooks, and official government reports on stunting cases. The results of the examinations were then analyzed by calculating the percentage of normal and low values using the following formulas:

- Percentage of normal results = (number of normal samples) / (total samples) × 100%
- Percentage of low results = (number of low samples) / (total samples) × 100%

Result

Based on research conducted by researchers in the working area of the Kajen 1 Community Health Center, from a population of 27 toddlers, 18 toddler samples that met the inclusion criteria were taken, with the following results:

TABLE 1. Hemoglobin Levels of Stunted Toddlers in the Kajen 1 Community Health Center Working Area

Sample Code	Infant Age (Months)	Hemoglobin Level	Description
S1	21	12,0 g/dl	Normal
S2	18	12,7 g/dl	Normal
S3	26	14,6 g/dl	Normal
S4	17	12,0 g/dl	Normal
S5	16	11,7 g/dl	Normal
S6	19	12,5 g/dl	Normal
S7	11	11,0 g/dl	Normal
S8	13	13,0 g/dl	Normal
S9	16	12,0 g/dl	Normal
S10	24	15,4 g/dl	Normal
S11	26	11,5 g/dl	Normal
S12	21	15,4 g/dl	Normal
S13	25	12,7 g/d	Normal
S14	24	13,3 g/dl	Normal
S15	26	11,4 g/dl	Normal

S16	14	11,0 g/dl	Normal
S17	18	11,8 g/dl	Normal
S18	24	12,8 g/dl	Normal

Based on Table 1, the average hemoglobin value in stunted children in the working area of the Kajen 1 Community Health Center was above 11.0 g/dl, with the lowest hemoglobin value being 11.0 g/dl and the highest being 15.4 g/dl.

TABLE 2. Percentage of Hemoglobin Levels in Stunted Toddlers in the Kajen 1 Community Health Center Working Area

Hemoglobin Level	Frequency	Percentage
Normal	18	100%
Quantity	18	100%

Based on Table 2, it is known that of the 18 blood samples from stunted toddlers in the working area of the Kajen 1 Community Health Center, all 18 samples had normal hemoglobin levels, with a percentage of 100%.

TABLE 3. Hematocrit Levels of Stunted Toddlers in the Kajen 1 Community Health Center Working Area

Sample Code	Infant Age (Months)	Hematocrit Level	Description
S1	21	33 %	Low
S2	18	34 %	Normal
S3	26	39 %	Normal
S4	17	32 %	Low
S5	16	31 %	Low
S6	19	35 %	Normal
S7	11	33 %	Low
S8	13	31 %	Low
S9	16	34 %	Normal
S10	24	36 %	Normal
S11	26	35 %	Normal
S12	21	37 %	Normal
S13	25	35 %	Normal
S14	24	38 %	Normal
S15	26	33 %	Low
S16	14	31 %	Low
S17	18	32 %	Low
S18	24	37 %	Normal

Based on Table 3, the average hematocrit value in stunted children in the working area of the Kajen 1 Community Health Center was 34%, with the lowest hematocrit level being 31% and the highest being 39%.

TABLE 4. Percentage of Hematocrit Levels in Stunted Toddlers in the Working Area of Kajen 1 Community Health Center

Hematocrit Level	Frequency	Percentage
Normal	10	44%
Low	8	56%
Total	18	100%

Based on Table 4, it is known that of the 18 blood samples from stunted toddlers in the working area of the Kajen 1 Community Health Center, 10 samples had normal hematocrit levels with a percentage of 56%, while 8 samples had low hematocrit levels with a percentage of 44%.

Discussion

Research conducted in the working area of the Kajen 1 Community Health Center in Pekalongan Regency with a total of 18 toddler samples found that the hemoglobin values of all 18 stunted toddlers were normal. In this study, all stunted toddler samples had normal hemoglobin levels, meaning that none of the stunted toddlers were anemic. This could be influenced by several factors, such as additional nutritional intake provided for several months by the government through integrated health service posts (posyandu). In addition to iron and protein, globulin plays a role in the formation of hemoglobin, so the test results were normal. Based on the questionnaire data from the respondents' parents, on average, toddlers received assistance to consume eggs, fish, milk, and green vegetables in their daily menu. This means that their protein and iron intake requirements were well met so that their hemoglobin levels remained within normal limits. This study is in line with research conducted by (Hestiasih Nirwanto, 2022), which states that there is no significant relationship between hemoglobin levels and the growth of stunted toddlers. In that study, all stunted toddler samples had normal hemoglobin levels.

In the description of hematocrit values in stunted children in the working area of the Kajen 1 Community Health Center, out of 18 respondents, 8 toddlers had low hematocrit levels (44%) and 10 toddlers had normal hematocrit levels (55%). The average hematocrit value in stunted toddlers in the Kajen 1 Community Health Center working area was 34%, with the lowest hematocrit level being 31% and the highest being 39%. In this study, the number of stunted toddlers with normal hematocrit levels was higher than the number of stunted toddlers with low hematocrit levels. This could be influenced by the health condition of the toddlers when the samples were taken. Hematocrit levels are related to the number of erythrocytes and other blood cells such as leukocytes and thrombocytes. Anemia, polycythemia, and health conditions related to blood cell count play a significant role in determining hematocrit levels. Hematocrit levels can increase when the number of blood cells is high. A decrease in hematocrit levels can be caused by a decrease in the number of blood cells or changes in plasma fluid, such as in cases of dehydration (Anik Hutari Widyastuti, 2024).

Conclusion

The study showed that all 18 stunted toddlers had normal hemoglobin levels (>11.0 g/dl), while 56% had normal hematocrit levels and 44% had low hematocrit levels. The average hemoglobin level was 12.6 g/dl (range 11.0–15.4 g/dl), and the average hematocrit level was 34% (range 31–39%). Future research is recommended to assess the overall health status of stunted toddlers and include parameters of blood cell counts.

Acknowledgements

We would like to express our gratitude to all those who have directly or indirectly contributed to the completion of this research.

References

Anik Hutari Widyastuti, D. (2024). Susu Edemame untuk Meningkatkan KadarHemoglobin, Eritrosit dan Hematokrit Remaja Putri dengan Anemia. *Jurnal Penelitian Kesehatan Suara Forikes*, *Vol. 1-6*.

Dosen TLM Indonesia. (2020). Hematologi Teknologi Laboratorium Medik. In S. dkk Eva Ayu Maharani, S (Ed.), *EGC*. Penerbit Buku Kedokteran EGC.

Hana Anindya Chairunnisa, D. (2024). Studi Kasus Stunting di Puskesmas Kecamatan Mampang Prapatan, Jakarta Selatan Berdasarkan Analisa Pemeriksaan Darah Rutin. *Ners*, *Vol. 8*, 1574.

Hasnawati S, D. (2024). Hubungan Kadar Hemoglobin Dengan Kejadian Stunting Pada Anak di Wilayah Kerja Puskesmas Antang Kota Makassar. *Promotif Preventif*, *7*, 784.

Hestiasih Nirwanto, D. (2022). Hubungan Kadar Hemoglobin dengan Pertumbuhan Pada Balita Stunting dan Wasting. *Ilmiah Kebidanan Imelda*, *8*, 94.

Nabila Hurulaini Nurrahman, D. (2020). Faktor dan Dampak Anemia pada Anak-Anak, Remaja, dan Ibu Hamil serta Penyakit yang Berkaitan dengan Anemia. *Jurnal of Science, Technology, and Entrepreneurship*, *2*, 46–50.

Organization, W. H. (2015). Stunting In A Nutshell. In *Departmental Update*.

Rizki Handayani, D. (2023). Perbandingan Kadar Hemoglobin pada Anak Stunting dan NonStunting. *Mahasiswa Kedokteran*, *Vol. 3*, 84.