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ASSOCIATED FACTORS WITH TREATMENT ADHERENCE IN CHILDREN AGED 1 TO 3 YEARS: A STUDY AT THE "SEÑOR DE LOS MILAGROS" HEALTH CENTER, HUAYCÁN – ATE

FACTORES ASOCIADOS A LA ADHERENCIA AL TRATAMIENTO EN NIÑOS DE 1 A 3 AÑOS. UN ESTUDIO EN EL CENTRO DE SALUD "SEÑOR DE LOS MILAGROS" HUAYCAN – ATE

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ABSTRACT

Objective: To determine the factors associated with treatment adherence in children aged 1 to 3 years at the "Señor de los Milagros" Health Center in Huaycán – Ate. **Methods:** This observational, retrospective, cross-sectional study investigated adherence to anti-anemic treatment in 169 children aged 1 to 3 years diagnosed with anemia, selected from an initial group of 300. Using a data collection form, variables covering maternal, sociocultural, treatment, and health system aspects were evaluated through bivariate analysis and Pearson's Chi-square test. **Results:** The results highlighted low treatment adherence, with only 4.7% of children showing high adherence and 15.4% demonstrating non-adherence. Higher adherence was observed in mothers with secondary education, homemakers, and those living with their partners. Factors such as receiving understandable information, respectful treatment, and proximity to the health center positively influenced adherence. **Conclusion:** There is a significant association between adherence to anti-anemic treatment and maternal, sociocultural, and treatment-related factors ($p<0.05$), suggesting that improving communication, socioeconomic support, and accessibility could enhance therapeutic adherence.

Keywords: Anemia; Treatment adherence; Factors. (Source: MESH-NLM)

RESUMEN

Objetivo: Determinar los factores asociados a la adherencia al tratamiento en niños de 1 a 3 años en el centro de salud "Señor de los Milagros" Huaycán – Ate. **Métodos:** Este estudio observacional, retrospectivo y de corte transversal investigó la adherencia al tratamiento antianémico en 169 niños de 1 a 3 años diagnosticados con anemia, seleccionados de un grupo inicial de 300. Utilizando un formulario de recolección de datos, se evaluaron variables que abarcaban aspectos maternos, socioculturales, de tratamiento y del sistema de salud, mediante análisis bivariado y la prueba de Chi-cuadrado de Pearson. **Resultados:** Los resultados destacaron una baja adherencia al tratamiento, con solo el 4,7% de los niños mostrando alta adherencia y un 15,4% presentando no adherencia. Se observó una mayor adherencia en madres con educación secundaria, amas de casa y en convivencia con su pareja. Factores como la recepción de información comprensible, el trato respetuoso y la proximidad al centro de salud influían positivamente en la adherencia. **Conclusión:** Existe una asociación significativa entre la adherencia al tratamiento antianémico y los factores maternos, socioculturales y los relacionados con el tratamiento ($p<0.05$), sugiriendo que mejorar la comunicación, el soporte socioeconómico y la accesibilidad podría potenciar la adherencia terapéutica
Palabras clave: Anemia, adherencia al tratamiento, factores.

Keywords: Anemia; Treatment adherence; Factors. (Fuente: DeCS- BIREME)

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INTRODUCTION

The World Health Organization (WHO) defines anemia in children under 5 years of age as a hemoglobin concentration <11g/dL at sea level, with iron deficiency being the most common cause worldwide[1]. To date, a prevalence of up to 39.8% has been calculated, equivalent to 269 million children globally affected by anemia, making it a significant public health issue[2]. In Latin America, the World Bank determined in 2019 that the prevalence of anemia was 20%, with Venezuela (28%), Peru (30%), Bolivia (37%), and Haiti (60%) having the highest rates [3]. By 2020, in Peru, according to Instituto de Estadística e Informática (National Institute of Statistics and Informatics), 40.1% of children aged 6 to 35 months suffer from anemia, translating to nearly 700 thousand anemic children under 3 years of age out of 1.6 million nationwide[4]. It has been demonstrated that this high prevalence of anemia in children can be corrected with iron therapy, and adherence to treatment is essential, meaning the consistent intake of medication according to prescribed dosages, schedule, and duration.

Additionally, the prevalence is higher in children under 3 years of age due to their rapid growth rate and consequent iron demands, compounded by low consumption of iron-rich foods, low birth weight, parasitic infections, and frequent episodes of diarrhea. These factors result in motor development delay by 10 months, cognitive processing issues by age 10, recognition memory impairment by age 19, and poor emotional health around age 20[5]. According to a 2020 study published in The Journal of Pediatrics, one of the primary reasons attributed to the persistent prevalence of childhood anemia is poor adherence to oral iron therapy [6]. The WHO considers this as the degree to which a patient's behavior regarding prescribed therapeutic compliance correlates with what is indicated by the healthcare professional, recognizing it as a severe issue, given that the therapeutic adherence rate for chronic diseases is approximately 50.0%[7].

This alarming situation has prompted the Peruvian government to implement iron supplementation for 4-month-old children to prevent anemia, reaching 54.2% coverage in 2021[8].

However, this anemia prevention plan must evaluate the compliance with such supplementation, as demonstrated by a 2023 study in the Piura province, where only 47.9% of children completed the treatment [9]. It was concluded that more than 50% of children were not adhering to anemia treatment due to various factors such as residing in rural areas, micronutrient deficiency in diets, low birth weight, prematurity, maternal anemia, mixed or artificial breastfeeding, growth rate, iron loss during development, and/or underlying pathologies[10,11]. Economic issues, difficulty accessing healthcare facilities, language barriers, beliefs, customs, and challenges in supplement usage also play significant roles[12,13].

Regarding factors, they can be defined as "detectable characteristics in individuals associated with a high likelihood of indicators and may be linked to health" [14]. The WHO classifies adherence-related factors into four categories: patient-related (economic status, occupation, knowledge, attitudes, beliefs, fears, perceptions, patient and family expectations, age, parent confidence in healthcare team, family climate, and positive treatment expectations); therapy-related (complexity and duration of treatment, previous treatment failures, side effects, and the need for lifestyle changes); healthcare personnel-related (medication distribution system issues, overburdened healthcare workers, lack of follow-up interest, lack of support networks, inadequate activity planning, and physician-patient relationship); and disease-related (physical, psychological, and social risks)[15,16,17].

Based on the aforementioned considerations and the high rate of anemia in children under 3 years of age, this study aimed to determine the factors related to adherence to anti-anemic treatment in children aged 1 to 3 years at the "Señor de los Milagros" Health Center in Huaycán – Ate.

METHODS

Study Design and Area

An observational, quantitative, correlational, cross-sectional study was conducted on children aged 1 to 3

years receiving care at the "Señor de los Milagros" Health Center located in Huaycán, district of Ate, from June 2019 to February 2020.

In 2017, the total population of Ate was 599,196 inhabitants, considered a district of extensive size, with areas inhabited largely by families of low to middle-low socioeconomic status, as well as families living in poverty or extreme poverty.

Population and Sample

The study population consisted of 300 mothers with children aged 1 to 3 years undergoing anti-anemic treatment prescribed at the "Señor de los Milagros" Health Center in Huaycán, Ate. For sample selection, a simple random probabilistic sampling process was applied using the Epidat 3.4 program, with a confidence level of 95%, a margin of error of 5%, and a power of 80%. The sample size calculation was based on the therapeutic adherence variable with an Odds ratio of 3.43, resulting in a sample size of 169 mothers.

Inclusion criteria included surveys with informed consent accepted from mothers with children aged 1 to 3 years attending the "Señor de los Milagros" Health Center diagnosed with anemia and prescribed anti-anemic treatment between June 2019 and February 2020. Exclusion criteria encompassed surveys from mothers with children diagnosed outside the specified time frame, those not within the specified age range, and those who did not provide informed consent to participate.

Variables and Instruments

In the present study, the independent variable considered was the associated factors, which include the following factors related to the mother: level of education, occupation, and marital status; mother's sociocultural factor: knowledge about anemia; treatment-related factor: perception of discomfort with treatment, treatment interruption, improvements observed with treatment, and difficulties with treatment intake; and health system-related factor: waiting time, doctor-patient interaction, information provided, and understanding. On the other hand, the dependent variable was adherence to anti-anemic treatment, which was categorized as low adherence, medium adherence, high adherence, and non-adherence.

For data collection, a form previously validated and endorsed by 9 subject matter experts was used, taken from the thesis published in 2010, "Adherence to iron-deficiency anemia treatment in children aged 6 to 24 months and associated factors, C.S.M.I. Tahuantinsuyo Bajo, 2010." The collected data consisted of 21 questions related to the degree of treatment adherence and associated factors such as mother's factor, treatment factor, health system factor, and mother's sociocultural factor, with binary response options (yes, no). Regarding the levels of adherence, pediatric teaching experts agreed that 12 to 13 affirmative responses indicated high adherence, 10 to 11 responses indicated medium adherence, 8 to 9 responses indicated low adherence, and 7 or fewer responses indicated non-adherence.

Procedures

After providing information about the research project and obtaining signed informed consent, the survey instrument, which was validated and anonymous, was administered to participating mothers. The survey application time was approximately 20 minutes per participant.

Statistical analysis

The Statistical Package for the Social Sciences (SPSS) version 23 was used to analyze the data. The prevalence of the degrees of adherence to anti-anemic treatment and associated factors was described. Additionally, the association between independent variables and the dependent variable was evaluated using odds ratios, and population homogeneity was verified using the chi-square test. Data were recorded in Excel for MacOS 11.0 for the presentation of tables.

Ethical considerations

The study was authorized by the head of the "Señor de los Milagros" Health Center in Huaycán – Ate, in accordance with the ethical principles of the Declaration of Helsinki of the World Medical Association for medical research involving human subjects. Regarding ethical principles, professional conduct will be maintained by storing patient data without

duplication. Confidentiality will be upheld by not disclosing patient data. Therefore, in accordance with bioethics, justice will be respected in terms of results, beneficence, and non-maleficence. The information collected from the health center will be kept confidential, as the data collection form will not request patient names or phone numbers.

•Participation: Participation will be voluntary, with verbal information provided by the interviewer and accepted through prior informed consent.

•Risks: No risks will be posed to the participants.

•Benefits: No personal benefits will be provided, although gratitude will be expressed for the support in raising awareness about the factors associated with adherence to anti-anemic treatment.

•Confidentiality: Survey-generated information will be anonymous, without personal data included for greater reliability.

RESULTS

According to Table 1, the levels of adherence to anti-anemic treatment in children aged 1 to 3 years show that 55.6% (94) had low adherence, followed by 24.3% (41) with medium adherence, and 4.7% (8) with high adherence. However, 15.4% (26) had no adherence to the anti-anemic treatment.

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Table 1. Levels of adherence to anti-anemic treatment in children aged 1 to 3 years at the "Señor de los Milagros" Health Center, Huaycán – Ate.

Level	n	%
High adherence	8	4.7
Medium adherence	41	24.3
Low adherence	94	55.6
Non-adherence	26	15.4
Total	169	100.0

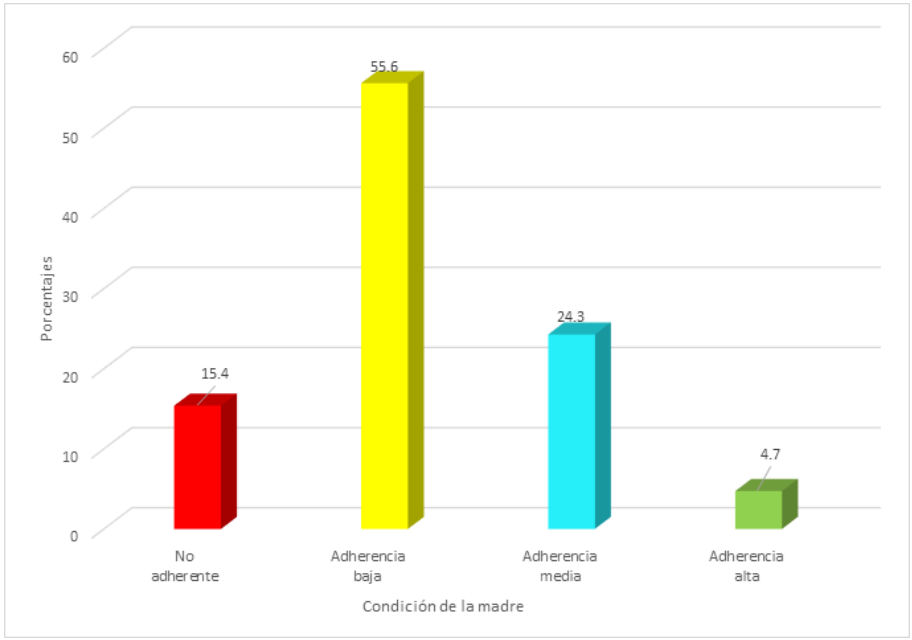

Figure 1. Levels of adherence to anti-anemic treatment in children aged 1 to 3 years at the "Señor de los Milagros" Health Center in Huaycán – Ate.

Table 2. Maternal factors associated with the level of adherence to anti-anemic treatment in children aged 1 to 3 years at the "Señor de los Milagros" Health Center in Huaycán – Ate.

	Adherence					
	Non-adherence	Low adherence	Medium adherence	High adherence	Total	Statistical test
Education level						
Primary	4 (14.3%)	16 (57.1%)	8 (28.6%)	0 (0%)	28 (100%)	
Secondary	12 (11.4%)	54 (51.4%)	31 (29.5%)	8 (7.6%)	105 (100%)	x^2=17.30
Higher	10 (27.8%)	24 (66.7%)	2 (5.6%)	0 (0%)	36 (100%)	Sig=0.008
Occupation						
Homemaker	20 (13.4%)	84 (56.4%)	37 (24.8%)	8 (5.4%)	149 (100%)	
Businesswoman	6 (60%)	4 (40%)	0 (0%)	0 (0%)	10 (100%)	x^2=22.25
Student	0 (0%)	4 (50%)	4 (50%)	0 (0%)	8 (100%)	Sig=0.008
Professional	0 (0%)	2 (100%)	0 (0%)	0 (0%)	2 (100%)	
Marital status						
Married	10 (31.3%)	12 (37.5%)	8 (25%)	2 (6.3%)	32 (100%)	
Cohabiting	14 (10.9%)	76 (58.9%)	33 (25.6%)	6 (4.7%)	129 (100%)	x^2=12.70
Single	2 (25%)	6 (75%)	0 (0%)	0 (0%)	8 (100%)	Sig=0.048
Total	26 (15.4%)	94 (55.6%)	41 (24.3%)	8 (4.7%)	169 (100%)	

Table 3. Sociocultural and treatment factors associated with the level of adherence to anti-anemic treatment in children aged 1 to 3 years at the "Señor de los Milagros" Health Center in Huaycán – Ate.

	Adherence					
	Non-adherence	Low adherence	Medium adherence	High adherence	Total	Statistical Test
1. Do you consider anemia as a serious illness in children?						
Yes	26 (15.4%)	94 (55.6%)	41 (24.3%)	8 (4.7%)	169 (100%)	
2. Can anemia be cured only with iron-containing medications?						
No	16 (14%)	62 (54.4%)	30 (26.3%)	6 (5.3%)	114 (67.5%)	x^2=1.33
Yes	10 (18.2%)	32 (58.2%)	11 (20%)	2 (3.6%)	55 (32.6%)	Sig=0.722
3. Can anemia be cured with an iron-rich diet?						
No	0 (0%)	8 (66.7%)	2 (16.7%)	2 (16.7%)	12 (7.1%)	x^2=6.46
Yes	26 (16.6%)	86 (54.8%)	39 (24.8%)	6 (3.8%)	157 (92.9%)	Sig=0.091
4. Is the treatment for anemia prolonged?						
No	0 (0%)	10 (58.8%)	7 (41.2%)	0 (0%)	17 (1.01%)	x^2=6.07
Yes	26 (17.1%)	84 (55.3%)	34 (22.4%)	8 (5.3%)	152 (89.9%)	Sig=0.108
5. Which of these foods contains more iron?						
Meat and legumes	26 (15.4%)	94 (55.6%)	41 (24.3%)	8 (4.7%)	169 (100%)	

6. What problems has the child experienced during the time of treatment with ferrous sulfate?						
Constipation	8 (10.8%)	94 (55.6%)	18 (24.3%)	6 (8.1%)	74 (43.8%)	
Diarrhea	2 (25%)	62 (54.4%)	2 (25%)	0 (0%)	8 (4.8 %)	x^2=77.04
Nausea or vomiting	0 (0%)	32 (58.2%)	3 (42.9%)	2 (28.6%)	7 (4.14%)	Sig=0.000
Blackening of stools	14 (22.2%)	8 (66.7%)	13 (20.6%)	0 (0%)	63 (37.3%)	
Teeth staining	2 (11.8%)	86 (54.8%)	5 (29.4%)	0 (0%)	17 (10.1%)	
7. Did you interrupt the treatment for this reason?						
No	13 (16.3%)	10 (58.8%)	18 (22.5%)	6 (7.5%)	80 (47.3%)	x^2=2.82
Yes	13 (14.6%)	84 (55.3%)	23 (25.8%)	2 (2.2%)	89 (52.7%)	Sig=0.420
8. Do you think your child is improving with the treatment?						
No	6 (66.7%)	94 (55.6%)	3 (33.3%)	0 (0%)	9 (5.33%)	x^2=22.31
Yes	20 (12.5%)	42 (56.8%)	38 (23.8%)	8 (5%)	160 (94.7%)	Sig=0.000
9. Does your child take ferrous sulfate without any difficulty?						
No	4 (25%)	4 (25%)	8 (50%)	0 (0%)	16 (9.5%)	x^2=9.70
Yes	22 (14.4%)	90 (58.8%)	33 (21.6%)	8 (5.2%)	153 (90.5%)	Sig=0.021
10. Does your child eat iron-rich foods without any difficulty?						
No	2 (15.4%)	8 (61.5%)	3 (23.1%)	0 (0%)	13 (7.7%)	x^2=0.76
Yes	24 (15.4%)	86 (55.1%)	38 (24.4%)	8 (5.1%)	156 (92.3%)	Sig=0.858
11. Is it difficult for you to prepare iron-rich foods every day?						
No	12 (16%)	34 (45.3%)	25 (33.3%)	4 (5.3%)	75 (44.37%)	x^2=7.28
Yes	14 (14.9%)	60 (63.8%)	16 (17%)	4 (4.3%)	94 (55.6%)	Sig=0.064

Table 4. Health system factor associated with the level of adherence to anti-anemic treatment in children a ged 1 to 3 years at the "Señor de los Milagros" Health Center in Huaycán – Ate.

	Adherence					
	Non-adherence	Low adherence	Medium adherence	High adherence	Total	Statistical Test
12- Were you given information about your child's illness?						
Yes	26 (15.4%)	94 (55.6%)	41 (24.3%)	8 (4.7%)	169 (100%)	
13- Were you given information about your child's anemia treatment?						
Yes	26 (15.4%)	94 (55.6%)	41 (24.3%)	8 (4.7%)	169 (100%)	
14- Were you informed about iron-rich foods?						
Yes	26 (15.4%)	94 (55.6%)	41 (24.3%)	8 (4.7%)	169 (100%)	
15. Was the information provided easy to understand?						
No	4 (28.6%)	10 (71.4%)	0 (0%)	0 (0%)	14 (8.3%)	x^2=6.84
Yes	22 (14.2%)	84 (54.2%)	41 (26.5%)	8 (5.2%)	155 (91.7%)	Sig=0.077
16. Were all your doubts answered?						
No	2 (28.6%)	3 (42.9%)	2 (28.6%)	0 (0%)	7 (4.1%)	x^2=1.44
Yes	24 (14.8%)	91 (56.2%)	39 (24.1%)	8 (4.9%)	162 (95.8%)	Sig=0.696

17. Do you think the information provided will help your child with the treatment?						
Yes	26 (15.4%)	94 (55.6%)	41 (24.3%)	8 (4.7%)	169 (100%)	
18. Were you treated well?						
No	2 (33.3%)	4 (66.7%)	0 (0%)	0 (0%)	6 (3.56%)	x^2=3.24
Yes	24 (14.7%)	90 (55.2%)	41 (25.2%)	8 (4.9%)	163 (96.44%)	Sig=0.356
19. Do you feel you were disrespected at any time?						
No	24 (14.8%)	89 (54.9%)	41 (25.3%)	8 (4.9%)	162 (95.9%)	x^2=3.27
Yes	2 (28.6%)	5 (71.4%)	0 (0%)	0 (0%)	7 (4.2%)	Sig=0.352
20. Do you miss your child's check-ups because your home is far from the health post?						
No	20 (14.9%)	73 (54.5%)	33 (24.6%)	8 (6%)	134 (79.3 %)	x^2=2.37
Yes	6 (17.1%)	21 (60%)	8 (22.9%)	0 (0%)	35 (20.7%)	Sig=0.500
21. Do you think they take too long to attend to you?						
No	4 (7.3%)	28 (50.9%)	21 (38.2%)	2 (3.6%)	55 (32.6%)	x^2=10.53
Yes	22 (19.3%)	66 (57.9%)	20 (17.5%)	6 (5.3%)	114 (67.5%)	Sig=0.015

DISCUSSION

In this study aimed at determining factors associated with adherence to anti-anemic treatment in children aged 1 to 3 years, it was found that 15.4% of children did not adhere to the prescribed treatment. These findings are similar to those reported by the World Health Organization (WHO)2, which indicates non-adherence rates to any pharmacological treatment ranging from 15% to 93%. However, it is noted that the adherence observed in our study, although relatively high, predominantly falls within the medium adherence category, suggesting that mothers meet the minimum requirements prescribed by healthcare providers.

Adherence to treatment poses a significant public health challenge, necessitating interventions to eliminate barriers to poor therapeutic adherence to improve population health9,15. In a study by Diaz et al., factors associated with adherence to anti-anemic treatment in children under 3 years were related to the absence of the caregiver (58%) and lack of attendance at health services (44%) [18]. Moreover, adherence to treatment becomes more challenging and complex when the treatment duration is long with daily dosing, requiring effort, time, and knowledge about the treatment by the mother or caregiver [8,16].

The current study demonstrated that various maternal factors, such as secondary education attainment, occupation as a homemaker, and cohabiting marital status, exhibited a higher level of medium and low adherence ($p<0.05$). Additionally, maternal education and closeness to the child contribute to better anemia treatment [10,16].

When considering sociocultural and treatment-related factors associated with adherence to anti-anemic treatment (Table 3), it was found that all of them acknowledge anemia as a serious condition, with meat and legumes being the richest sources of iron. Only 55 mothers believed that anemia can be cured solely with iron, followed by the majority (157 mothers) advocating for iron-rich dietary intake alone, and 152 mothers indicating that treatment is prolonged. On the other hand, concerning treatment-related factors, side effects such as constipation and dark stool color were reported, leading 52% of mothers to discontinue treatment. Nevertheless, 94% of mothers believed that their child was improving with treatment, with 90% of them administering iron without difficulty, although 55% found it challenging to prepare iron-rich foods daily. Other studies have reported similar findings[10]. All these associations correspond to low adherence.

Among the factors of the health system associated with adherence to anti-anemic treatment (Table 4), we observed that regarding the information provided to the mother, there is adherence to knowledge of the child's disease, treatment of anemia, the information was easily understandable, all doubts were answered including which foods are rich in iron, and she is confident that all this information will aid in her child's recovery process.

Adherence to all these information factors was mostly of low category. On the other hand, the treatment received by the mothers was good, there was no disrespect at any time, the mother does not miss her child's appointments despite the distance, and if she feels they take too long to attend to her (all adherence ranging from low to medium), the p value is less than 0.05. Several studies have had similar findings[13,14,16,18]. To improve adherence, strategies such as simplifying treatment regimens, counseling sessions, reminder systems, supervision and incentives for healthcare personnel, family therapy, psychological therapy, and phone follow-up19 are recommended.

Currently, there is a willingness to combine more than one strategy to reinforce the message and increase impact. For our case of anemia, options would include communicative educational intervention, family and community involvement, and strengthening monitoring, supervision, and surveillance systems[17,18]. We consider that in this study, some values found have discrepancies in terms of their level of significance; therefore, it is necessary to conduct further analytical studies with more representative samples to identify factors according to each context.

CONCLUSIONS

1. A total of 15.4% of mothers did not fully adhere to the prescribed treatment.
2. Mothers with secondary education and homemakers showed the highest levels of adherence (low to medium).
3. Regarding maternal knowledge about anemia, higher adherence was observed among mothers who:
Recognized anemia as a serious condition.
4. Understood the importance of prolonged treatment and iron-rich foods.
Perceived improvement in their child's health with treatment.
Factors associated with higher adherence included:
Receiving information that was easy to understand.
Experiencing respectful treatment without disrespect.
Facing challenges in attending their child's appointments due to the distance from their residence.

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