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Brief communication

Risk factors for anemia in six-month-old infants

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Electra Guerra Domínguez I* https://orcid.org/0000-0002-0917-9460

Daiana Pérez Marín I https://orcid.org/0000-0002-5663-573X

Maritza Gilda Leyva González II https://orcid.org/0000-0002-9633-5803

[Yo]Granma University of Medical Sciences. Jimmy Hirzel Teaching Polyclinic. Bayamo, Granma, Cuba.

[II]Luis Ángel Milanés Children's Hospital. Bayamo, Granma, Cuba.

* Corresponding author:elektra.grm@infomed.sld.cu

SUMMARY

This brief communication is carried out with the objective of presenting preliminary results of a research project. This is an epidemiological, observational, analytical, and prospective case-control study in six-month-old children belonging to the area of the Jimmy Hirzel Teaching Polyclinic, Granma province, during 2022-2023, which aimed to identify risk factors hypothetically associated with anemia in infants. The sample consisted of 34 cases and 102 controls. To analyze the association between anemia and the risk factor, the OR and Chi square

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were applied, with 95% reliability and probability <0.05. As results, there was an association (p <0.05) between prenatal risk factors (maternal malnutrition and anemia during pregnancy), and the natal factor (prematurity), and anemia in the infant. Maternal malnutrition was the only risk factor that was independently associated with infant anemia.

Keywords: Anemia; Infants; Six-month-old children; Risk factors.

SUMMARY

This brief communication is made with the aim of publicizing preliminary results of a research project. This is an epidemiological, observational, analytical, and prospective case-control study in six-month-old children belonging to the area of the Jimmy Hirzel teaching polyclinic, Granma province, during 2022-2023, which aimed to identify the risk factors hypothetically associated with anemia in infants. The sample consisted of 34 cases and 102 controls. To analyze the association between anemia and risk factor, OR and Chi-square were applied, with reliability of 95% and probability <0.05. As results, there was an association (p<0.05) between prenatal risk factors (malnutrition and maternal anemia during pregnancy), and the natal factor (prematurity), and anemia in infants. Maternal malnutrition was the only risk factor that was independently associated with infant anemia.

Keywords: Anemia; Infants; Six-month-old children; Risk factors.

SUMMARY

This brief communication is intended to disseminate preliminary results of a research project. This is an epidemiological, observational, analytical and prospective case-control study in children of six months of age belonging to the area of the Jimmy Hirzel Polyclinic, province of Granma, during 2022-2023, which aims to identify the risk factors hypothetically associated with anemia in babies. The sample was composed of 34 cases and 102 controls. To analyze the association between anemia and risk factors, OR and Qui-quadration were applied, with

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reliability of 95% and probability <0.05. As results, there was an association (p<0.05) between pre-natal risk factors (maternal malnutrition and anemia during pregnancy) and natal factors (prematurity) and anemia in infants. Maternal malnutrition was the only risk factor that was independently associated with childhood anemia.

Keywords: Anemia; Lactating; Six-month-old babies; Cliff factors.

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Introduction

Anemia is defined as the presence of a hemoglobin concentration below the reference limits for age and sex. It represents a global public health problem, especially in children, with serious consequences for their health and social and economic development. The main cause of anemia in childhood is iron deficiency, most often caused by insufficient iron intake. (1,2)

Currently, iron deficiency anemia is one of the main specific nutritional deficiencies in the world and in Cuba. It affects two-thirds of children in developing countries. The magnitude of the problem, combined with the functional impact of this deficiency on quality of life, requires effective measures to contribute to its reduction. (3)

A series of factors favor the appearance of anemia in children, which is why it has a higher incidence in them: growth, infections, dietary errors, scarcity and lability of pre- and postnatal stores, manifestation of congenital etiological factors. (4,5) This research is carried out with the aim of identifying the risk factors hypothetically associated with anemia in six-month-old children.

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Methods

Epidemiological, observational, analytical, and prospective case-control study in six-month-old infants belonging to the“El Golfo” Clinic, “Jimmy Hirzel” Polyclinic, Bayamo municipality, during 2022-2023.The universe included all six-month-old infants in the clinic who underwent hemoglobin testing at that age, through the MINSAP program, to determine the presence of anemia.

Sample characterization

Case-control selection: For each case included in the study (a child with hemoglobin levels below 110 grams per liter and clinical signs of anemia), two controls (children with hemoglobin levels of 110 grams per liter or higher) were selected by simple random method, with a ratio (1:3), consisting of 34 cases and 102 controls. Children whose medical histories presented difficulties for collecting primary data and those with a family history of sickle cell anemia were excluded.

Variables studied.

Dependent: Anemia.

Independents: Risk factors:prenatal (anemia during pregnancy and maternal malnutrition), natal (prematurity and low birth weight), and postnatal (inadequate breastfeeding during the first 6 months of life, malnutrition, repeated acute infections).

Methods used: theoretical (historical-logical, inductive-deductive, analysis-synthesis), empirical (review of documents: medical records), and statistical (percentage calculation to quantitatively analyze the results; the cross-product ratio -OR- and the Chi square were applied as an epidemiological instrument to have a measure that quantifies the strength of association between anemia and the risk factor, with a reliability of 95% and a probability less than 0.05. Univariate and multivariate analysis were performedthrough the statistical package SPSS version 22.0 for Windows.

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Results

Table 1 shows the association between prenatal factors and infant anemia. Maternal malnutrition was statistically significantly associated, with mothers with this condition having a 13,467 higher risk of having a child with anemia at six months of age (OR 13,467 CI 1,450-125,098 p 0.022).Maternal anemia also showed statistically significant values, demonstrating that anemia during pregnancy increases the risk of the child presenting anemia at six months of age by 2.447 (OR 2.447 CI 1.081-5.540 p 0.032).

Table 1. Prenatal factors. Univariate analysis.

Factors	Categories	Cases (n=34)		Controls (n=102)		OR	(95% CI)		P
		No.	%	No.	%				
Maternal malnutrition	Yeah	4	11.8	1	0.9	13,467	1,450	125,098	0.022
	No	30	11.8	1	0.9				
Maternal anemia	Yeah	23	67.6	47	46.1	2,447	1,081	5,540	0.032
	No	11	32.4	55	53.9				

Fountain: Medical records

Table 2 presents the association of natal and postnatal factors with infant anemia. Prematurity was statistically significantly associated (OR 9.774 CI 1.981–97.360 p 0.050), with premature infants having a 9.774-fold increased risk of infant anemia compared with full-term infants.

Only one infant in the Case group was of low birth weight, so comparative analysis with the Control group could not be performed.

Table 2. Natal and postnatal factors. Univariate analysis.

Risk factor	Chi square	P	OR	95% CI	
				Lower	Superior

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Maternal malnutrition	5,048	0.025	15,775	1,422	175,017
Maternal anemia	3,501	0.061	2,388	0.960	5,941
Prematurity	2,296	0.130	7,190	0.560	92,253
Inadequate breastfeeding	0.671	0.413	1,459	0.591	3,603
Repeated infections	0.049	0.826	1,124	0.398	3,172

Fountain: Medical records

When analyzing the inadequate practice of breastfeeding, there was a greater risk (1.224) in cases than in controls of presenting infant anemia, but the univariate analysis showed results that were not statistically significant (OR 1.224 CI 0.558-2.614 p 0.614).

The postnatal factor of infant malnutrition in the first six months was studied, but since there was only one case, univariate analysis could not be performed.

When analyzing the association between repeated infections and infant anemia, despite the predominance of these in the Cases group, and that they present a higher risk 1,119, the analysis showed values that were not statistically significant (OR 1.119 CI 0.445-2.814 p 0.811).

Table 3 shows the results of the multivariate binary logistic regression analysis, which shows that maternal malnutrition during pregnancy was independently associated with anemia in the infant at six months.

Table 3. List of risk factors for anemia in six-month-old infants. Multivariate analysis.

Factors	**Categories**	**Cases (n=34)**		**Controls (n=102)**		**OR**	**(95% CI)**		**P**
		No.	**%**	**No.**	**%**				
Prematurity	Yeah	3	8.8	1	0.9	9,774	1,981	97,360	0.050

	No	31	91.2	101	99.1				
Inadequate breastfeeding	Yeah	15	44.1	40	39.2	1,224	0.558	2,683	0.614
	No	19	55.9	62	60.8				
Recurrent acute infections	Yeah	8	23.5	22	21.6	1,119	0.445	2,814	0.811
	No	26	76.5	80	78.4				

Discussion

Several researchers have shown that the antecedent of dmaternal nutrition during pregnancyIt is among the causes of infant anemia, and can be explained because the pregnant woman with malnutrition has not achieved an optimal recovery that allows the proper growth and development of a child inside her. (6,7)

Maternal iron deficiency during pregnancy increases the risk of iron deficiency in the infant. Several conditions can increase the risk of iron deficiency anemia during the first months of life by reducing iron stores at birth, making it one of the main risk factors. (5-8)

Espitia de la Hoz F and Lilian Orozco (5) pointed out in their study that infants with a history of maternal anemia during pregnancy were more likely to develop anemia than the group of infants without a history of maternal anemia during pregnancy, coinciding with our study. On the contrary, Gutiérrez Retamozo FC[(7)]found that thetonemia ismore common in infants with no history ofmaternal anemia during pregnancy.

Prematurity and low birth weight are important determinants of neonatal mortality and morbidity, with long-term consequences. Children born prematurely not only experience higher mortality and morbidity in the neonatal period, but also later in life.

Perin J (8) showed in a sample of 150 children that prematurity and low birth weight are determinants associated with iron deficiency anemia; for his part, GUtiérrez Retamozo FC

([7])concluded in his study that theanemiaincreases inpremature infants; results similar to those found in this research.

Breast milk is designed to meet all the nutritional and immunological needs of young children. Feeding habits during this early phase influence nutritional status and can impact childhood, adolescence, and adulthood. (9)

Pérez Ayma R, (10) in her research on factors related to anemia in six-month-old infants at the Hipólito Unanue National Hospital, Peru, 2021, alleges that 88.89% (X2: 17.01, p=0.00, p<0.05) of infants did not receive exclusive breastfeeding; in the present investigation where, despite the fact that less than 50% of children did not receive EBF, the results were not statistically significant.

InsideAmong the causes of anemia in childhood are infections, the most frequent being bacterial and viral infections. (1)These are mediated by cytokines, causing a decrease in iron utilization and red blood cell production. (1,6)

Cruz-Peña and collaborators (6) in their 2019 study at the "Concepción Agramonte Bossa" Polyclinic in Camagüey,agree with this study in stating that, due to the characteristics of age, anemia is more frequent intheinfants with a history of irecurrent acute infections.

In conclusion, it was possible to demonstrate that some of the risk factors for anemia in six-month-old infants described in the medical literature were present in the children investigated, these were prenatal factors: malnutrition and maternal anemia during pregnancy and within the natal factors,prematurity.

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Conflict of interest

The authors declare that there are no conflicts of interest for the publication of the article.

Authorship contribution

Conceptualization, Data Curation and Formal Analysis: Electra Guerra Domínguez, Daiana Pérez Marín.

Research, Methodology and Project Management: Electra Guerra Domínguez, Maritza Gilda Leyva González.

Resources: Daiana Pérez Marín, Maritza Gilda Leyva González.

Supervision: Electra Guerra Domínguez.

Validation: Electra Guerra Dominguez, Daiana Perez Marin.

Visualization: Maritza Gilda Leyva González.

Writing – original draft: Electra Guerra Domínguez, Daiana Pérez Marín, Maritza Gilda Leyva González.

Writing – review and editing: Electra Guerra Domínguez.

I, Electra Guerra Domínguez, on behalf of all the co-authors, declare the veracity of the content of the article.

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