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Clinical and epidemiological characteristics of malnourished children under five years of age

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SUMMARY



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Protein-energy malnutrition is aThis study, which examines one of the leading causes of childhood morbidity and mortality worldwide, involved a descriptive, longitudinal, and prospective epidemiological study of 189 malnourished children under five years of age in the area served by the Jimmy Hirzel Polyclinic in Bayamo, Granma Province, Cuba, between 2018 and 2023. The objective was to determine clinical and epidemiological characteristics of the children, their mothers, and their families that might be related to the condition. Theoretical, empirical, and statistical methods were employed. Key findings included that 36% of the children were born prematurely and 46% with low birth weight; 55.6% received mixed feeding until six months of age, and 63.5% received inadequate complementary feeding; males predominated (54.5%), as did the infant and toddler groups (67.2%); and 27% presented with comorbidities. Among the mothers, those aged 20 to 34 (50.8%), with pre-university education (36%), and employed (40.2%) were the most prevalent, as were those with pregnancy-related illnesses (71.4%); 32.8% had chronic diseases. Within the families, 59.8% lived in homes with adequate structural conditions, 70.4% had a middle income, and 45.5% lived in overcrowded conditions. It was concluded that most of the malnourished children under five years of age studied had personal and family circumstances that contributed to their malnutrition.

KeywordsMalnutrition; Low weight; Complementary feeding; Breastfeeding.

SUMMARY

Protein-energy malnutrition is one of the leading causes of morbidity and mortality in childhood worldwide. An epidemiological, descriptive, longitudinal, and prospective study was conducted on 189 malnourished children under five years of age in the Jimmy Hirzel Polyclinic area, Bayamo municipality, Granma province, Cuba, during the period 2018–2023, with the objective of determining some clinical and epidemiological characteristics present in the child, the mother, and the family that could be related to the disease. Theoretical, empirical, and statistical methods were used. Among the relevant results, 36% of the children were born prematurely and 46% with low birth weight; 55.6 % received mixed breastfeeding up to 6 months of age, and 63.5 % had



inadequate complementary feeding; males (54.5%) and the infant and transitional age group (67.2%) predominated; 27% had comorbidities. Among the mothers, those aged 20–34 years (50.8%), with a pre-university level of education (36%), employed (40.2%), and with pregnancy-associated illnesses (71.4%) stood out; 32.8% had chronic diseases. In families, 59.8 % lived in homes with fair structural conditions, 70.4 % had a medium income level, and 45.5 % lived in overcrowded conditions. It was concluded that most of the malnourished children under five years of age studied lived in personal and family conditions that favored malnutrition.

Keywords:Malnutrition; Low birth weight; Complementary feeding; Breastfeeding.

SUMMARY

Energy-protein malnutrition is one of the main causes of childhood morbidity and mortality worldwide. An epidemiological, descriptive, longitudinal and prospective study was carried out with 189 malnourished children under five years of age, in the area of the Jimmy Hirzel Polyclinic, municipality of Bayamo, province of Granma, Cuba, during the period from 2018 to 2023, with the objective of determining some clinical and epidemiological characteristics present in the children, in the mother and in the family that They could be related to the job. Foram used theoretical, empirical and statistical methods. As relevant results, 36% of children were born prematurely and 46% were underweight; 55.6% received mixed food within 6 months and 63.5% received inadequate complementary food; Boys will predominate (54.5%) in the infant and transition group (67.2%); 27% present comorbidities. Among the others, we highlight the communities between 20 and 34 years of age (50.8%), pre-university education (36%), workers (40.2%) and doenças associated with pregnancy (71.4%); 32.8% presented chronic illnesses. Of the families, 59.8% lived in residences with regular structural conditions, 70.4% had average income and 45.5% lived in superlot conditions. It is concluded that, in the majority of the malnourished children under five years of age studied, there are personal and family conditions that favor malnutrition.

Key words:Malnutrition; Low weight; Complementary nutrition; Maternal joy.



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Introduction

Malnutrition is the measurement that most clearly reflects the alterations in health and nutrition that a child experiences and accumulates, regardless of their causes and even the development of a country. (1)

Insufficient height for age is called stunting. It results from chronic or recurrent malnutrition, generally associated with poor socioeconomic conditions, poor maternal nutrition and health, recurrent illness, and/or inappropriate feeding or care for infants and young children. Stunting prevents children from fully developing their physical and cognitive potential. Children who weigh less than expected for their age are underweight and may also exhibit stunting and/or wasting. (2)

Inadequate intakes of vitamins and minerals (micronutrients) pose a significant threat to the health and development of populations worldwide, particularly children and pregnant women in low-income countries.(2)

The negative effect on growth and development in children will depend on the timing, severity, and duration of the nutritional deficiency. In general, children under one year of age are the most susceptible due to their rapid growth rate and vulnerability to diarrheal diseases, respiratory illnesses, and other infections. (3)

Factors that influence malnutrition include demographic, social, and cultural factors, the child's health status, and dietary habits. (4.5)

In Latin America and the Caribbean, one in every 100 children under five suffers from acute malnutrition, for a rate of 1.3%, very low compared to the global rate of 7.5%. Chronic malnutrition has also decreased, from 11.4% in 2012 to 9.6% in 2017. (6)

In Cuba, a series of measures are being adopted to prevent malnutrition. (7,8) Thanks to all this work, it is among the countries with the lowest prevalence of undernourishment in the Americas region. Nevertheless, children continue to be diagnosed with malnutrition on the island. (8)

According to statistical data from the Provincial Health Sector, the province of Granma presents a similar behavior to the rest of the country, and there are still some cases of mild and moderate malnutrition in the child population, especially in children under five years of age, which affects all municipalities.

In an investigation carried out in the area of the Jimmy Hirzel polyclinic, in the municipality of Bayamo, during the three-year period 2014-2016, 80 children under two years of age were reported with mild and moderate malnutrition. (9) After that date, in the same health area, children under five years of age have been diagnosed with protein-energy malnutrition, which motivates and justifies this investigation, with the objective of determining some epidemiological and clinical characteristics present in these children, during the period 2018-2023, that could be related to the disease.

Methods

A descriptive, longitudinal, and prospective epidemiological study was conducted on malnourished children under five years of age from the Jimmy Hirzel Polyclinic in Bayamo, Granma Province, with the aim of characterizing them clinically and epidemiologically. Variables studied included the children (history of prematurity and low birth weight, age, sex, breastfeeding and complementary feeding, comorbidities), their mothers (age, education level, occupation, pregnancy-related illnesses, chronic diseases), and their families (housing conditions, overcrowding, income). The study population comprised 224 children under five years of age



registered as malnourished during the period 2018–2023, and the sample consisted of those who met the selection criteria: 189 children with protein-energy malnutrition whose mothers consented to participate in the research and who remained in the health area throughout the study.

Malnutrition was diagnosed through nutritional assessment of each child, using Cuban growth charts (weight/height, weight/age, and height/age). Weight was measured in kg and height in cm, and all children with a nutritional assessment below the third percentile were considered malnourished.

The individual medical records of the children and mothers were reviewed, as well as the family medical records to study each variable; homes were visited to determine aspects related to the families.

Operationalization of variables

Child:

- Prematurity: depending on the gestational age at birth (dichotomous nominal qualitative variable). It was categorized as present (children born before 37 weeks of gestational age) and absent (children born at 37 weeks or more of gestational age).
- Low birth weight (dichotomous nominal qualitative variable): categorized as present (weight less than 2,500 g) and absent (weight of 2,500 or more).
- Age groups (nominal qualitative variable): categorized into infants and toddlers (from six months to 1 year, 11 months and 29 days), and preschoolers (from 2 years to 4 years, 11 months and 29 days). Infants from six months of age were selected to evaluate feeding practices with exclusive breastfeeding and the introduction of complementary feeding.
- Sex (dichotomous nominal qualitative variable): was divided into male and female, according to biological category.
- Breastfeeding (nominal polytomous qualitative variable): it was categorized as exclusive, if the infant was fed only with breast milk until six months of age; mixed, when other milk was offered

in addition to breast milk until that same age; and artificial, when the infant was never breastfed and was fed with other milk or formula.

- Complementary feeding (dichotomous nominal qualitative variable): it was categorized as correct, when the child was offered food according to the scheme guided by their attending physician in accordance with national protocols, and incorrect, when the above was not fulfilled.
- Comorbidity (dichotomous nominal qualitative variable): it was categorized as present when the child presented one or more non-acute and non-infectious diseases, simultaneously with the malnourished condition and absent when the above was not met.

Mother:

- Age (continuous quantitative variable): categorized as under 20 years, 20-34, 35 and over.
- Level of schooling (ordinal qualitative variable): it was categorized as primary, secondary, pre-university and university, depending on the last level completed.
- Occupation (nominal qualitative variable): categorized as student (if only studying), housewife (if working at home without pay), and worker.
- Diseases associated with pregnancy (dichotomous nominal qualitative variable): categorized as present if one or more acute diseases were present during pregnancy (urinary tract infection, vaginal discharge syndrome, anemia, gestational diabetes, hypertensive disease of pregnancy, etc.) or absent if the above was not met.
- Chronic diseases (dichotomous nominal qualitative variable): categorized as present if it was present one or more non-acute diseases (high blood pressure, diabetes mellitus, bronchial asthma, epilepsy, heart disease, hypothyroidism, etc.) or absent if the above was not met.

Family:

- Structural conditions of the dwelling (ordinal qualitative variable): it was categorized as good, when it had a roof in good condition (except those made of guano), with walls not cracked, tile floor or other structure except earth and with sanitary service; fair, when it did not meet one of the above conditions; guano roofs, earth floors, latrines in poor condition or open defecation were not considered in this category; bad, if it did not meet 2 or more requirements that define



the good category, here were included dwellings with guano roof, earth floor, latrines in poor condition, badly located or open defecation.

- Overcrowding conditions (nominal qualitative variable): it was categorized as overcrowded, when more than 2 people lived with the child in the same room and not overcrowded, when up to 2 people lived with the child.

- Economic income (ordinal qualitative variable): it was categorized as low, when families received up to 750 monetary units per month (in Cuban pesos); medium, between 750-2,000 and high, more than 2,000.

Methods used in the research

- Theoretical: historical-logical and analytical-synthetic.
- Empirical: review of medical records of the child, the mother and the family (interview with the mothers), and observation.
- Statistics: absolute and relative frequencies were used as summary measures of descriptive statistics.

Results

Table 1 presents the characteristics of the malnourished children. Thirty-six percent were premature and 46% had low birth weight. The study group was predominantly infants and toddlers (67.2%) and male (54.5%). Regarding feeding practices, the majority received mixed feeding until 6 months (55.6%), and those who received inadequate complementary feeding (63.5%). Twenty-seven percent presented with comorbidities.

Table 1. Characteristics of malnourished children under five years of age.

Variable	# (n=189)	%
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Prematurity	Present	68	36.0
	Absent	121	64.0
Low birth weight	Present	87	46.0
	Absent	102	54.0
Age groups	Infants and transitional children	127	67.2
	Preschoolers	62	32.8
Sex	Male	103	54.5
	Female	86	45.5
Breastfeeding	Exclusive until 6 months	63	33.3
	Mixed until 6 months	105	55.6
	She didn't receive it.	21	11.1
Complementary feeding	Incorrect	120	63.5
	Correct	69	36.5
Comorbidity	Present	51	27.0
	Absent	138	73.0

Source: medical records

Table 2 shows that there was a higher percentage of mothers aged 20 to 34 years (50.8%), who had reached the pre-university level of education (36%), workers (40.2%), with pregnancy-related illnesses (71.4%) and without chronic illnesses (67.2%).

Table 2. Characteristics of mothers of malnourished children under five years of age.

Variable		# (n=189)	%
Age (years)	<20	68	36.0
	20-34	96	50.8
	35 and over	25	13.2
Schooling	Primary	10	5.3
	Secondary	51	27.0
	Pre-university	68	36.0
	University	60	31.7
Occupation	Student	62	32.8
	Worker	76	40.2

	Housewife	51	27.0
Associated diseases to pregnancy	Present	135	71.4
	Missing	54	28.6
Chronic diseases	Present	62	32.8
	Missing	127	67.2

Source: medical records

Table 3 shows the characteristics of the families, highlighting those that had homes with regular structural conditions (59.8%), received average economic income (70.4%), and were not overcrowded (54.5%).

Table 3. Characteristics of families of malnourished children under five years of age.

Variable		# (n=189)	%
Structural conditions of the house	Regular	113	59.8
	Hello good	73	38.6
	Bad	3	1.6
Economic income	High	16	8.5
	Half	133	70.4
	Low	40	21.1
Overcrowded conditions	Missing	103	54.5
	Present	86	45.5

Source: medical records

Discussion

When evaluating the characteristics of the children studied, it is noteworthy that more than a third were premature and almost half had low birth weight. In the research carried out in the same health area, to characterize malnourished children under two years of age during 2014-2016, the number of premature infants was similar and more than 70% had low birth weight. (9)

In 2021, a study entitled “Magnitude and trend of malnutrition and factors associated with stunting in children under five years of age in Mexico” found that 4.8% of children under 5 years of age were underweight, 14.2% were stunted, and 1.4% were wasted. (10)

Mamani-Urrutia V and collaborators, in their publication “Nutritional status of children under 6 months of age in a pediatric hospital center in Peru: prevalence and associated factors,” they concluded, by eMultivariate analysis showed that there was an association between birth weight and malnutrition. (11)

Coinciding with this research, in the work of Fernández-Martínez and collaborators, Hodgson MI and co-authors, and Juma Paspuel and others, malnourished children under two years of age were more numerous. (12-14) For their part, Deleón CA et al, (15) found a predominance of those over two years of age in 58.7%.

Of the children studied, only one-third received exclusive breastfeeding until six months, and a small number never received it. Regarding complementary feeding, only a small proportion of the sample received it adequately.

In the article “Determining factors in child malnutrition in San Juan and Martinez, 2020”, (12) the authors identify as determining factors of child malnutrition the duration of exclusive breastfeeding less than three months and inadequate complementary feeding (51.6% and 65% of cases, respectively).

Reyes Montero and collaborators, (16) also find among the predisposing factors for malnutrition, the exclusion of breastfeeding and the insufficiency in the complementary feeding process, which is related to what was obtained in the present study.

Regarding associated comorbidities, it is important to highlight that almost a third of the children had this condition. A study on mortality in malnourished children admitted to intensive care shows the association between malnutrition, severe illness, and mortality. (17)

Risk factors and illnesses experienced by pregnant women influence the fetus and can affect its health status from the beginning of intrauterine life: adolescent mothers, low level of education, lack of employment, acute or chronic illnesses during pregnancy.

Most of the mothers of the children studied were between 20 and 34 years old, the ideal age for conception, since from age 20 onward a woman is physically and psychologically prepared for motherhood. However, it should be noted that more than a third of the mothers were adolescents, a worrying result because there is an increase in teenage pregnancy in Cuba. (8) Studies carried out in the municipality of Bayamo, where this research was conducted, obtained similar results. (9)

There were more mothers with a pre-university level of education and a work relationship, in accordance with the educational level and predominant occupation in the majority of Cuban women. This result is consistent with that of national publications, (9) and differs from the findings in a study in Peru, where the predominant schooling was primary and secondary. (18)

Pregnancy-related illnesses were present in three-quarters of the mothers studied, and chronic illnesses in one-third. The negative impact of these illnesses on the developing fetus is well known.

High blood pressure is known as a risk factor for numerous diseases, including low birth weight and malnutrition in early childhood. Authors have linked this and other chronic and pregnancy-related diseases to low birth weight and malnutrition in early childhood. (19)

Gómez Mendoza C et al, (20) show in their study of mothers who had low birth weight children, Vaginal sepsis was present in 71.7%, followed by anemia at 32% and high blood pressure at 29.4%.

Childhood malnutrition is a multifactorial health problem, as it is related to biological, cultural, environmental, economic, and institutional factors. In this series, most of the children came from middle-income families and lived in homes with adequate structural conditions.

Studies conducted in Latin America and developing countries agree that low purchasing power, limited education, and poor food hygiene are linked to high rates of malnutrition, in addition to the interaction between malnutrition and infections, which exacerbate each other. The first five years of life are a crucial time for an individual's development; it is considered a short but unique period, as the appropriate interaction of the aforementioned factors will allow them to reach

their maximum growth and development potential due to the particular biological characteristics of this stage and the presence of risk factors that affect their growth and development, as well as their future health in adulthood. (14,15)

The results of this study demonstrate that childhood malnutrition is closely linked to multiple causes, many of which can be prevented with early interventions, even before conception, preparing the future mother (and the family) to begin the pregnancy and reach its end in the best health conditions.

Conclusions

It was concluded that in most of the malnourished children under five years of age investigated, there were personal and family conditions that favored malnutrition.

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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

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Formal Analysis and Research, Writing – original draft: Nora Almaguer Céspedes, Electra Guerra Domínguez and María Esther Martínez Guerra.

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Visualization, Writing –revision and editing: Daiana Pérez Marín and Adalgizar Martínez Jiménez.

I, Nora Almaguer Céspedes, on behalf of all the co-authors, declare the veracity of the content of the article.