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Clínical Review

Malnutrition and heart disease in the Yanomami population: an integrative review of the literature

Desnutrição e doença cardíaca na população Yanomami: uma revisão integrativa da literatura

Desnutrición y enfermedades cardíacas en la población Yanomami: una revisión integradora de la literatura

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Abstract

Malnutrition is a condition that refers to deficiencies, excesses or imbalances in an individual's energy and/or nutrient intake. The aim of this study was to track the main factors observed between malnutrition and the occurrence of heart disease in an indigenous population, particularly the Yanomami ethnic group. This is an integrative, descriptive literature review. A search was carried out in the main electronic databases: PubMed, LILACS and SciELO. For this, terms compatible with DeCS/MeSH were used through advanced search strategies with the help of Boolean operators. In the search carried out, 48 scientific articles published in the period between 2014 and 2024 were identified. This review observed reports of severe acute malnutrition and indicated that children who survive severe malnutrition are still at risk of developing chronic diseases such as high blood pressure, even after recovery of immediate nutritional status, in addition to height-for-age deficit in 35.8% of children. Conclusion: It is important that public health efforts include measures to prevent and treat these conditions, considering the specific needs and cultural contexts of indigenous populations. Therefore, more studies are needed to analyze other risk factors associated with cardiovascular diseases in these populations.

Keywords: Malnutrition; Indigenous peoples; Cardiovascular diseases.

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Resumo

A desnutrição é uma condição que se refere a deficiências, excessos ou desequilíbrios na ingestão de energia e/ou de nutrientes do indivíduo. Com isso, esta revisão visa rastrear os principais fatores observados entre a desnutrição e a ocorrência de doenças cardíacas na população indígena, especialmente a da etnia Yanomami. Trata-se de uma revisão de literatura do tipo integrativa, de caráter descritivo. Foi realizada uma busca nas principais bases de dados eletrônicas: PubMed, LILACS e SciELO. Para isso, foram usados termos compatíveis com o DeCS/MeSH Terms por meio de estratégias de buscas avançadas com auxílio de operadores booleanos. Na busca realizada foram identificados 48 artigos científicos publicados no período entre 2014 e 2024. Nesta revisão foram observados relatos de desnutrição aguda grave e que indicaram que as crianças que sobrevivem à desnutrição severa ainda apresentam risco de desenvolver doenças crônicas, como hipertensão arterial, mesmo após a recuperação do estado nutricional imediato, além de déficit de altura para idade (A/I) em 35,8% das crianças. Desse modo, é importante que os esforços de saúde pública incluam medidas para prevenir e tratar essas condições, levando em consideração as necessidades específicas e os contextos culturais das populações indígenas. Assim, são necessários mais estudos para analisar outros fatores de riscos associados às Doenças Cardiovasculares (DCVs) nessas populações.

Palavras-chave: Desnutrição; Povos indígenas; Doenças cardiovasculares.

Resumen

La desnutrición es una condición que se refiere a deficiencias, excesos o desequilibrios en la ingesta de energía y/o nutrientes del individuo. Con esto, este trabajo tiene como objetivo rastrear los principales factores observados entre la desnutrición y la ocurrencia de enfermedades cardíacas en la población indígena, especialmente de la etnia Yanomami. Se trata de una revisión de literatura integrativa, de carácter descriptivo. Se realizó una búsqueda en las principales bases de datos electrónicos: PubMed, LILACS y SciELO. Para esto, las palabras usadas fueron compatibles con DeCS/MeSH Terms mediante estrategias de búsqueda avanzadas con ayuda de operadores booleanos. En la búsqueda realizada fueron identificados 48 artículos científicos publicados entre 2014 y 2024. En esta revisión fue posible observar informes de desnutrición aguda grave e indicaron que los niños que sobreviven a la desnutrición severa aún presentan riesgo de desarrollar enfermedades crónicas como la hipertensión arterial, incluso después de la recuperación del estado nutricional inmediato, además de un déficit de talla para su edad (A /I) en el 35,8% de los niños. Por lo tanto, es importante que los esfuerzos de salud pública incluyan medidas para prevenir y tratar estas condiciones, teniendo en cuenta las necesidades específicas y los contextos culturales de las poblaciones indígenas. Por lo tanto, se necesitan más estudios para analizar otros factores de riesgo asociados a las enfermedades cardiovasculares (ECV) en estas poblaciones

Palabras clave: Desnutrición; Pueblos indígenas; Enfermedades cardiovasculares.

INTRODUCTION

Malnutrition is a condition that refers to deficiencies, excesses or imbalances in an individual's energy and/or nutrient intake. The term "malnutrition" covers three major groups: the first, undernutrition, which includes wasting (low weight for height), stunting (low height for age) and underweight (low weight for age); the second, micronutrient-related malnutrition, which includes micronutrient deficiencies (lack of important vitamins and minerals) or excess micronutrients; and the third, which includes overweight, obesity and diet-related non-communicable diseases (such as heart disease, stroke, diabetes and some types of cancer).[1]

According to the report produced jointly by the United Nations Children's Fund (UNICEF), World Health Organization (WHO) and World Bank on indicators of child malnutrition, such as stunting, wasting and overweight, stunting is estimated to have affected 22.3% or 148 million children under 5 years of age worldwide in 2022, while wasting affected approximately 6.8% or 45 million children under 5 years of age in the same period.[2] In Brazil, 2,754 hospitalizations of babies under one year of age were recorded due to malnutrition, sequelae of malnutrition and nutritional deficiencies.[3] In indigenous children, the prevalence of low height for age ranged from 16 to 83.9%, with the highest percentage being observed in the North region, in the Yanomami/Amazonas ethnic group.[4]

Malnutrition is one of the risk factors for the development of cardiovascular diseases (CVDs), such as cardiomyopathy, heart failure, cardiac arrhythmia and, in some cases, sudden death during childhood. Malnutrition affects cardiovascular health in both childhood and adulthood and can lead to coronary artery disease, arterial hypertension and diabetes mellitus.[5] Bresan et al. observed a prevalence of 46% of arterial hypertension in Kaingang indigenous people.[6] The first reports on the health situation of the Yanomami people were described by Pithan et al., in which a greater number of cases of malaria were observed, followed by acute respiratory infections, tuberculosis, malnutrition, sexually transmitted diseases and gastrointestinal infectious processes.[7] The Yanomami are a hunter-farmer society of the northern Amazon rainforest, with an estimated population of 30,390 inhabitants whose contact with national society is, in most of their territory, relatively recent. Its territory covers approximately 192,000 km^2 and includes areas in the states of Amazonas and Roraima, as well as in Venezuela.[8]

These people had systematic contact only with a small number of non-indigenous people, represented by employees of government and non-governmental assistance agencies, and, intermittently, with a few extractivists or teams of scientists and journalists. Starting in August 1987, there was a sudden and massive invasion of the area by gold prospectors. The sociocultural, environmental and health consequences of this process quickly became visible.[8] The contact and interaction of indigenous peoples with the non-indigenous segment of the population caused economic, social, cultural and environmental changes, with emphasis on the reduction of territories traditionally occupied and explored by the former.[6]

The change in the profile of diseases that affect the Brazilian indigenous population with the emergence of chronic non-communicable diseases, such as CVDs, has been considered an important factor to be evaluated. Thus, malnutrition, especially early or chronic malnutrition, can cause long-term metabolic effects, increasing the risk of developing CVDs such as hypertension and atherosclerosis. Changes in serum lipids and energy metabolism resulting from nutritional deficiencies contribute to this risk. In addition, chronic inflammatory processes resulting from malnutrition are also predisposing factors for heart disease.[9] Thus, this review aims to track the main factors observed between malnutrition and the occurrence of heart disease in the indigenous population, especially the Yanomami ethnic group.

METHODS

Type of study

This is a descriptive integrative literature review.

Search strategy

A search was conducted in the main electronic databases: U.S. National Library of Medicine (PubMed), Latin American and Caribbean Literature in Health Sciences (LILACS) and Scientific Electronic Library Online (SciELO).

To this end, terms compatible with the Health Sciences Descriptors (DeCS)/Medical Subject Headings (MeSH terms) were used, such as “malnutrition”, “arterial hypertension”, “heart failure”, “cardiovascular disease”, “cardiac disease”, “indigenous” and “yanomami”, using advanced search strategies, with the help of the Boolean operators “AND”, “OR” and “NOT”.

Selection criteria

Original scientific articles available in full version for access published between 2014 and 2024 were included. The exclusion criteria applied were: publication date over 10 years old, books, book chapters, manuals, abstracts in conference proceedings, monographs, dissertations, theses and articles without abstracts.

Any articles that did not provide the methods clearly or were not available in full, or that were inadequate in terms of the proposed objectives, were excluded from this review. Only articles that reported biochemical, metabolic and pathophysiological characteristics associated with CVDs and malnutrition in indigenous populations were considered.

Data extraction and analysis

The authors were responsible for searching the databases used and also assumed responsibility for reading the articles in full, followed by a detailed review of all the works with approved eligibility.

Ethical considerations

This article did not require approval from the Research Ethics Committee (CEP) as it is a literature review without access to primary data, in accordance with Resolution 466/12 of the National Health Council (CNS).

RESULTS

The search identified 48 scientific articles published between 2014 and 2024 in the three databases researched. Four articles that fully met the eligibility criteria were included, which went through three major stages during the search and results process. Identification consisted of using search strategies to locate articles of interest. At this stage, the title and abstract were read.

In the screening stage, the methods sections of the articles located were read. Also at this point, studies that previously seemed appropriate to the topic were categorized as inadequate due to the lack of relevant information, according to the selection criteria. Finally, in the inclusion stage, all studies were read in full and critically analyzed (Figure 1).

Few studies were found that portray the reality of malnutrition and its association with CVD rates in indigenous populations both in Brazil and in other parts of the world. In this review, three articles involving the Brazilian population were found and only one portraying the reality of the population of Malawi, a country in East Africa. Lelijveld et al. followed Malawian children after severe acute malnutrition and indicated that those who survive severe malnutrition are still at risk of developing chronic diseases, such as high blood pressure, even after recovery of their immediate nutritional status.[10]

Regarding studies on the Brazilian population, Araújo et al. conducted a study in the state of Acre and identified a height-for-age deficit in 35.8% of children, with 11.5% presenting with severe impairment. The deficit was more prevalent in children living in rural areas and who had indigenous ancestry, where the prevalence of severe deficit was 20.3%.[11]

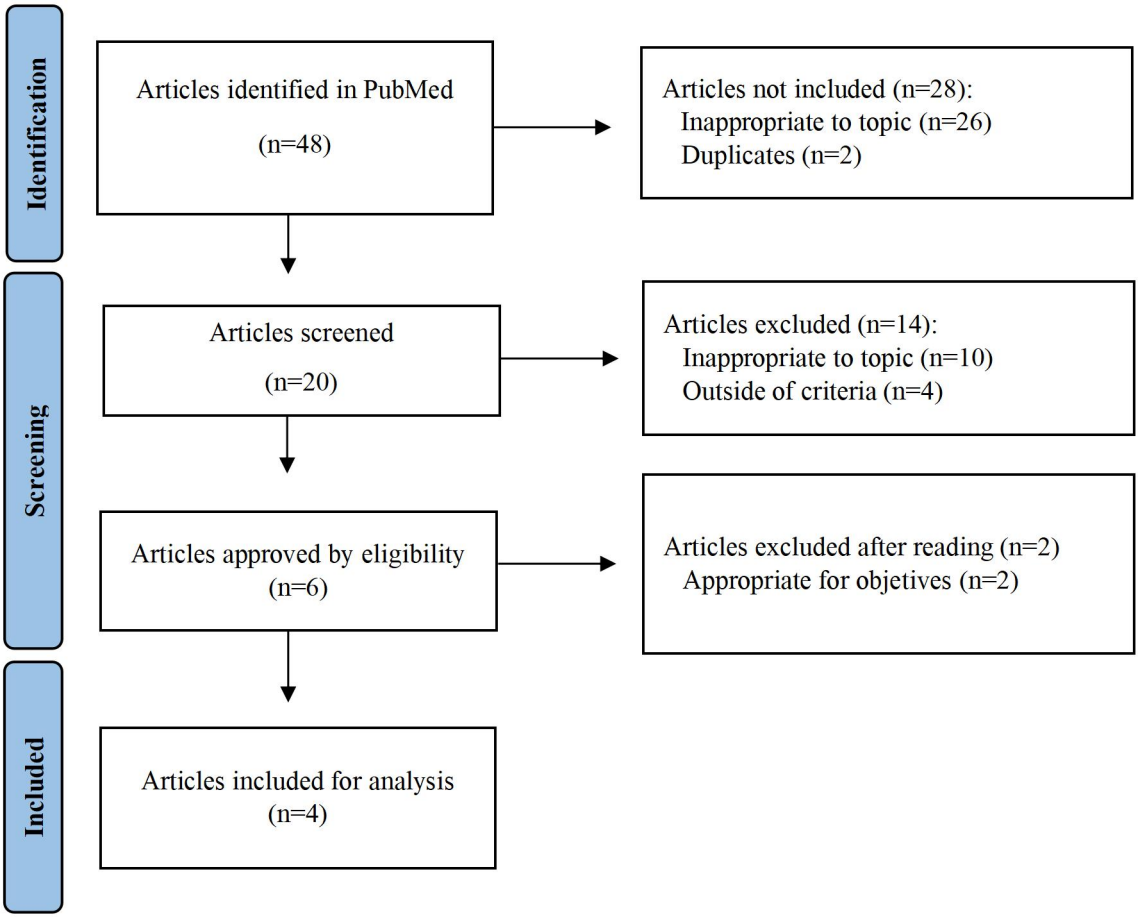

Figure 1. Search method and results. Number of publications in different search stages.

Anthropometric indices of nutritional status show high prevalence rates of stunting and underweight among indigenous children of the Xavante ethnic group in two communities in the state of Mato Grosso, especially in the first years of life, where low height for age was observed in 20.4% of boys and 18.7% of girls, predisposing to a greater risk of developing CVDs in adulthood.[12]

Similarly, the work of Jacques et al., carried out in 2024, examined children from the Yanomami-Ninam population who were chronically exposed to methylmercury. The authors observed anemia in 27.3% of the children and intellectual deficit in 55.2% of them. The results highlighted that this exposure can lead to several clinical, laboratory and neurodevelopmental abnormalities, in addition to the increased risk of developing chronic diseases.[13]

DISCUSSION

This integrative review aimed to observe, in the literature, whether there are records of a possible relationship between high levels of malnutrition present in indigenous individuals, especially in children, and the development of chronic diseases. It is known that chronic malnutrition is common among indigenous people of various ethnicities, including the Yanomami, and this condition can contribute to cardiovascular dysfunctions exacerbated by specific environmental and cultural factors.[14]

The studies included for analysis provide a comprehensive and multifaceted view of the challenges faced by children in different contexts of malnutrition and toxic exposure, highlighting critical implications for global public health and pediatrics by revealing that 35.8% of children were stunted, with 11.5% severely stunted.[11]

Stunting was more pronounced in rural areas and among children of indigenous descent, where the prevalence of severe stunting reached 20.3%. Early and inadequate introduction of cow's milk was identified as a contributing factor, in line with previous studies that point to the risks of replacing breast milk with inadequate alternatives that can lead to malnutrition and intestinal irritation.[11,15]

In a study of children in Malawi, it was observed that, in the long term, severe acute malnutrition increases the risk of chronic diseases even after nutritional status has recovered.[10] This increased risk was previously suggested by David Barker in his hypothesis that adverse conditions during fetal development and early childhood, such as intrauterine malnutrition or low birth weight, increase the risk of developing chronic diseases in adulthood, especially CVDs.[16,17]

Chronic malnutrition leads to a series of physiological changes, including muscle atrophy, impaired immune function and changes in basal metabolism. These changes directly impact the cardiovascular system, increasing susceptibility to heart disease.[18] The underlying physiological mechanisms include dysregulation of the autonomic nervous system, increased oxidative stress and chronic inflammation, all exacerbated by the lack of essential nutrients.[19]

Among the Yanomami, malnutrition can be associated with a series of heart problems, including cardiomyopathy, high blood pressure and heart rhythm disorders.[5] In addition, the lifestyle (sedentary lifestyle, high-calorie diets) and environmental conditions (deforestation, droughts or floods) of this population contribute to cardiovascular vulnerability.[20]

It is important to emphasize the need to prevent malnutrition and control harmful environmental exposures through long-term monitoring of children, especially those from vulnerable populations. This study, with a review of the literature, raises the concern and relevance of the topic by demonstrating that malnutrition is a significant risk factor for the development of heart disease, including for the Yanomami pediatric population, and that the physiological aspects of this population need to be better studied for effective interventions.

Limitations

This review was not systematic, although it attempted to follow the standardization proposed by the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) protocol. Therefore, limitations included the lack of systematization as recommended, the failure to perform any statistical analysis, and the inclusion of observational studies with potential selection bias.

FINAL CONSIDERATIONS

Therefore, it is imperative that observational studies, whether cross-sectional or longitudinal, be conducted in order to fill the gaps that still persist in order to improve the long-term quality of life of the Yanomami population. It is also important that public health efforts include measures to prevent and treat these conditions, taking into account the specific needs and cultural contexts of indigenous populations.

In the same way that it is necessary to implement public policies that focus on the self-sufficiency of these peoples, so that they can meet their needs without creating dependence on non-indigenous people, it is necessary to invest in a decisive manner in combating illegal mining, which is the basis for the worsening of this scenario. Thus, further studies are needed to analyze other risk factors associated with CVDs in these populations, in addition to showing the need to develop strategies to prevent and control the already evident risk factors for CVDs, given the fact that the indigenous population in Brazil has been historically marginalized.

CONFLICT OF INTERESTS

Nothing to declare.

AUTHORS' CONTRIBUTIONS

RPB: Project administration, Formal analysis, Conceptualization, Data curation, Writing–first draft, Investigation, Methodology. JVO: Formal analysis, Writing–review & editing, Methodology, Supervision, Validation.

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