

 Suzi Hellen Anaice de Araujo¹ Aldair da Silva Guterres² Socorro Nazaré Araújo Almeida Barbosa² Priscila Matos de Pinho³ Rosileide de Souza Torres² Jessika Larrisa Soares Marinho⁴ Mara Ludmila Lima Pereira⁴ Nathalia da Silva Reis⁴ Paulo de Tarso Toscano Junior²

¹ Centro Universitário do Estado do Pará, Curso de Pós-Graduação em Nutrição Clínica, Belém, PA, Brasil.

² Fundação Pública Estadual Hospital de Clínicas Gaspar Vianna, Serviço de Nutrição, Belém, PA, Brasil.

³ Fundação Pública Estadual Hospital de Clínicas Gaspar Vianna, Serviço de Nutrição e Dietética, Belém, PA, Brasil.

⁴ Escola Superior da Amazônia, Belém, PA, Brasil.

Correspondence

Suzi Hellen Anaice
suzi_anaice@hotmail.com

Nutritional risk screening application in hospitalized children and adolescents with congenital heart disease

Aplicação da triagem de risco nutricional em crianças e adolescentes hospitalizados com cardiopatia congênita

Abstract

Introduction: The nutritional screening in children is extremely important in the hospital environment because it is a simple and efficient tool. **Objective:** Detecting the nutritional risk, from pediatric nutritional screening *Strong Kids* method in children and adolescents with congenital heart disease. **Method:** 81 children and adolescents were evaluated with congenital heart disease until 48 hours of hospitalization, in the period from August 2016 to May 2017. The data collection was through a pediatric nutritional screening. The statistical analysis was through chi-square test for the purpose of verify the level of significance, $p < 0,05$. **Results:** Among the results obtained, there was a higher prevalence of children with hospitalized congenital heart disease of the female gender 60,49% (n=49). According to the classification of the life phases, the highest predominance was in the pre school phase (46,91%), then infants (27,16%), adolescents (13,58%) and scholar (12,35%). There was no nutritional deficit for 74,07%. According chi-square test, it was observed a relevance to the medium nutritional risk. **Conclusion:** The pediatric nutritional screening is extremely important in clinical practice, in view of the best form of evaluation through the reach of early nutritional intervention, this will entail adequate nutritional treatment, specially children with congenital heart disease.

Keywords: Congenital heart disease. Pediatrics. Malnutrition.

Resumo

Introdução: A triagem nutricional em crianças é de extrema importância no ambiente hospitalar, pois é uma ferramenta simples e eficiente. **Objetivo:** Detectar o risco nutricional, a partir do método de triagem nutricional pediátrica *Strong Kids*, em crianças e adolescentes com cardiopatias congênitas. **Método:** Foram avaliados 81 crianças e adolescentes com cardiopatia congênita, até 48 horas de internação, no período de agosto de 2016 a maio de 2017. Dados foram coletados através de triagem nutricional pediátrica. A análise estatística se deu através do teste qui-quadrado, a fim de verificar o nível de significância, $p < 0,05$. **Resultados:** Dentre os resultados obtidos, houve maior prevalência de crianças com cardiopatia congênita internadas do gênero feminino 60,49% (n=49). De acordo com a classificação das fases de vida, a predominância ocorreu na fase pré-escolar 46,91%, seguida de lactentes 27,16%, adolescentes 13,58% e escolar 12,35%. Não houve déficit nutricional para 74,07%. Segundo o teste qui-quadrado, observou-se relevância do médio risco nutricional. **Conclusão:** A triagem nutricional pediátrica é fundamental na prática clínica, e sua melhor forma de avaliação é a intervenção nutricional precoce. Isto implicará um tratamento nutricional adequado, em especial para crianças com cardiopatia congênita.

Palavras-chave: Cardiopatias congênitas. Pediatria. Desnutrição.

INTRODUCTION

Congenital heart disease (CHD) is an abnormality in cardiocirculatory structure and function, which is present since birth, and in some cases it is discovered after several years. Generally, these changes result from alterations in the embryonic period and defective fetal development and are considered one of the most serious chronic disease in children.¹ The etiology of this pathology has not yet been fully elucidated, but there are some related risk factors, such as genetic factors, chromosomal syndrome, smoking, illicit drugs and alcoholism during pregnancy, among others.²

Children affected by heart disease often have difficulty eating and excessive sweating. Feeding at the mother's breast is difficult for these patients, as they need to make a great effort to suck. Therefore, they stop breastfeeding because they get tired more easily. Besides, frequently there are appetite reduction and the decrease in nutrients absorption. These factors may contribute to nutritional imbalance.³

Malnutrition in these children causes a huge hospital problem because it increases the period of hospitalization and its costs, consequently. Performing nutritional screening is important for safe intervention during the care in the clinical and nutritional evolution.⁴ Besides, it is a great relevance method since it is a simple, low cost and efficient tool.⁵

Thereby, this work aimed to apply nutritional screening to children and adolescents affected by the congenital heart disease admitted in a reference cardiology hospital in Belém, State of Pará.

METHODS

Study design and participants

Quantitative, descriptive, and cross-sectional study. The convenience sample was comprised of 81 children and adolescents with CHD aged between 2 and 12 years old, of both sexes, in the first 48 hours of admission to the pediatric clinic of the *Fundação Pública Estadual Hospital de Clínicas Gaspar Vianna (FPEHCGV)* in Belém, state of Pará, from August 2016 to May 2017.

Our inclusion criteria were being aged between 2 and 12 years old, diagnosis by congenital heart disease, being hospitalized at *FPEHCGV*, accepting to participate in the research through sign a written informed consent form (WICF) and a term of assent, when necessary. The exclusion criteria were to be under 2 years old and over 12 years old, impossibility or refuse to participate in this research or sign WICF and not to be mental and physically able to be evaluated, and Down syndrome.

Regarding the age-related exclusion criteria, it is justified that the maximum age of admission to the pediatric clinic of *FPEHCGV* is 12 years old. The minimum age is related to the applicability of the nutritional screening method, which cannot be applied to children under 2 years old. The main goal of this research is to apply of nutritional screening method so the equivalence of the patient's ages was needed.

We applied the Screening Tool for Risk On Nutritional status and Growth (Strong Kids) subjective method to evaluate the children's nutritional risk. This tool has four evaluation items: subjective clinical evaluation; high-risk disease; dietary intake and weight loss. Each item is given a score provided when the answer to the question is positive. The sum of these points indicates the malnutrition risk. It allows the applicator to decide about the intervention and follow-up needed.⁶

We based on the Declaration of Helsinki and Nuremberg Code to guarantee ethical features. We respected the norms of research involving human beings (Resolution No 466/2012) of The National Council

of Health. Confidentiality of the participants was guaranteed by authorization from the hospital through WICF presented in two copies and one of them was left with the parent or guardian, after Research Ethics Committee approbation under file No 1.475.974.

Statistical Analysis

The Bioestat version 5.0 software was used to perform the Chi-square test in order to verify the significance level. The statistical significance considered was $p < 0.05$.

RESULTS

We evaluated 81 children and adolescents with CHD admitted at pediatric clinic, of which 60.49% ($n = 49$) were female and 39.51% ($n = 32$) male. Most of the participants were classified in preschool phase (46.91%), which corresponds to the age group of 2-6 years old, 27.16% were infants, 13.58% were adolescents and 12.35% were school (table 1).

Table 1. Percentage of children and adolescents with congenital heart disease (CHD) admitted in a reference cardiology hospital, according to gender and life stage. Belém-PA, 2017.

Variable	Category	N	%
<i>Gender</i>	Female	49	60.49
	Male	32	39.51
	Total	81	100.00
<i>Life Stage</i>	Infant	22	27.16
	Preschool	38	46.91
	School	10	12.35
	Adolescent	11	13.58
	Total	81	100.00

Table 2 shows items of Strong Kids assessment through the subjective clinical evaluation to assay nutritional deficit. For 74.07% ($n=60$) there were no nutritional deficiency. This topic showed 76.19% ($n=16$) children were in the chronic phase and 23.81% of them had a subcutaneous fat deficit.

Table 2. Children and adolescents with congenital heart disease (CHD) admitted in a reference cardiology hospital, according to items of nutritional risk screening Strong Kids. Belém-PA, 2017.

Variable	Category	N	%
<i>Nutritional Deficiency</i>	No	60	74.07
		2	
	Yes	1	25.93
	Total	81	100.00
<i>Sign of Nutritional deficiency</i>	Subcutaneous fat deficit	5	23.81
	Cachectic face	16	76.19
	Other	0	0.00
	Total	21	100.00

Table 2. Children and adolescents with congenital heart disease (CHD) admitted in a reference cardiology hospital, according to items of nutritional risk screening Strong Kids. Belém-PA, 2017. (Continues)

Variable	Category	N	%
<i>High nutritional risk disease or major surgery</i>	No	0	0.00
	Yes	81	100.00
	Total	81	100.00
<i>Dietary intake reduction and decreases in the last days</i>	No	65	80.25
	Yes	16	19.75
	Total	81	100.00
<i>Sign of reduced dietary intake and decreases in last days</i>	Difficulty feeding due to pain	0	0.00
	Previous nutritional intervention	1	6.25
	Vomiting	1	6.25
	Diarrhea >5 days	2	12.50
	Dietary intake reduction	12	75.00
	Total	16	100.00
<i>Loss or insufficient gain of weight in last weeks</i>	No	54	66.67
	Yes	27	33.33
	Total	81	100.00
<i>Sign of loss or insufficient gain of weight in last weeks</i>	No weight gain < 1 year	10	38.46
	Weight loss > 1 year	16	61.54
	Total	26	100.00

The second pediatric assessment item about nutritional high risk or major surgery demonstrated that all of the children (100%) with CHD needed heart major surgery.

Regarding the third item of the subjective pediatric assessment, which concerns the dietary intake reduced or decreases after hospitalization period, 19.75% (n=16) of all participants presented those alterations; the reduction of dietary intake occurred in 80.25% (n=65). About the signs of dietary intake reduction and decreases in the last days, we verified that 75% had reduced dietary intake; 12.50% had diarrhea while 6.25% had nutritional intervention and vomiting.

Those changes are more worrying in children with heart disease in pre and postoperative of major surgery. Weight loss, dehydration, reduction in absorption due to intestinal microvilli loss and inadequate nutrition status (malnutrition) may difficult preoperative period. There may also be postoperative consequences, such as worsening in clinical presentation, abnormal healing, and even death.

In the fourth pediatric screening item, we verified the loss or insufficient gain of weight in the last weeks or months. In 66.67% (n=54) of the sample there were weight loss and in 33.33% (n=27) there weren't. No que se refere ao quarto item de triagem pediátrica, que avalia a perda de peso ou ganho insuficiente nas últimas semanas ou meses, em 66,67% (n=54) houve perda de peso, e em 33,33% (n=27) não houve perda de peso.

Regarding the nutritional risk level (table 3) we observed that the population presented a medium nutritional risk. Therefore, Strong Kids subjective evaluation is viable to perform pediatric nutritional screening since it is useful for quickly and practically assessment of malnutrition risk and it allows early intervention.

Table 3. Children and adolescents with congenital heart disease (CHD) admitted in a reference cardiology hospital, according to the level of nutritional risk of Strong Kids. Belém-PA, 2017.

Level of nutritional risk	N	%	<i>p</i>
High	17	20.99	< 0.0001*
Medium	64	79.01	
Low	0	0.00	
Total	81	100.00	

Note: *Chi-square test: $p < 0.05$ – statistically significant differences.

DISCUSSION

In data analysis, the major of the hospitalized children were female, which agrees the study carried out by Aragão⁷ with 300 heart disease children admitted at Heart Hospital of Aracaju. In a systematic review, Boeira⁸ also found a higher prevalence of females. However, in a study that evaluated 180 children according Strong Kids, Secker & Jeejeebhoy⁹ showed that 57% of the children were male.

Our study divided participants into groups according to the life stage for better classification. Prevalent life stages were preschool (46.91%) and infants (27.16%). Simões survey¹⁰ found similar results: preschool (26%), school (24%) and adolescents (12.3%). On the other hand, Gouveia master thesis¹¹ showed predominance in preschool (48.6%), infants (23.1%), and school (28.3%). Lama et al.¹² identified a sample of 103 girls and 147 boys in the preschool stage. Thus, the results found in the literature were similar to ours. Aragão⁷ also obtained the majority of the patients in infant stage (47%) and preschool (24%), which may indicate in these life stages the clinical signs of the pathology are more evident since many patients has symptoms.

In table 2, we observed there was not nutritional deficiency (74.04%) in this research. According to Monteiro,¹³ children with CHD are a group of high nutritional risk, as they suffer the loss of body mass. Thus, damage to the body overall happens, especially to the heart and respiratory muscle which affects myocardial and ventilatory function.

A study developed by Araújo¹⁴ aimed to identify the incidence of pediatric nutritional deficiency and it found high prevalence in North and Northeast. These regions have a large low-income population which is one of the factors is responsible for the increase in neonatal morbidity and mortality rates.

As shown in table 2, 76.19% of the patients have a cachectic face and 23.81% have a subcutaneous fat reduction, so the majority of our patients presented nutritional changes. Generally, CHD results in several psychological and nutritional alterations. Monteiro master thesis¹³ assayed the nutritional status of CHD children and there was clinical evidence of malnutrition, such as prolonged rest, which decreases muscle mass; anorexia provoked by the pathology and its comorbidities, hypoxia, and hypermetabolism, which leads to weight loss and prognosis worsening. A survey performed by Ribeiro et al.¹⁵ evaluated children and adolescents admitted at a private hospital of Salvador-Bahia, it reported hospital malnutrition is public health adversity and that it is necessary to do early nutritional intervention.

Causes of nutritional risk and malnutrition can be observed in table 2. Of all participants, 75% had dietary intake reduction, 12.50% had diarrhea for more than 5 days and 6.25% had previous nutritional intervention and vomiting. Teixeira¹⁶ studied the nutritional profile of children and adolescents with CHD and it identified the malnutrition of these patients is due to several factors: inadequate caloric intake, reduced

appetite, the age that surgical correction has occurred, hypermetabolism, pulmonary changes, tachypnea and restriction of food volume.

Our assessment of the level of nutritional risk identified 79.01% of patients with medium nutritional risk and 20.99% had high nutritional risk. However, Moutinho's master thesis¹⁷ findings were different from ours. It showed 8.7% of patients with high nutritional risk, 58.7% with medium risk and 32.7% with low risk from 104 children with CHD admitted at the Hospital of Coimbra.

Nevertheless, Valandro's research¹⁸ found 27.3% of children with low nutritional risk, 64.8% with medium risk, and 7.9 with high risk during a nutritional screening of 455 children hospitalized in *Hospital da Criança Santo Antônio*. The predominance of medium nutritional risk also was found our results. The research of Marginean¹⁹ used Strong Kids nutritional screening to evaluate 271 hospitalized children with congenital malformation, respiratory disease, and cleft lip or palate and it verified 63.1% patients without malnutrition or nutritional risk, 21.8% with moderate nutritional risk and 15.1% with high risk.

Strong Kids method of nutritional screening used by this research showed the majority of its sample had a medium and high risk of nutrition, while no one had low risk. Thus, nutritional screening is as and effective and sensitive tool for risk diagnosis for these patients.

CONCLUSION

Our research had as a central problem CHD in children with medium and high nutritional risk, according to statistical analysis. It is noteworthy since nutritional changes are caused by factors related to the weight loss inherent to the CHD physiopathology.

According to the statistical processing and bibliography survey of this work, we found that most of the patients were female in the preschool and infant stages of life.

Thus, the nutritional screening has great importance in clinical practice since it is the best way of assessment and early nutritional intervention, which it will implicate an adequate nutritional treatment, especially in the cases of children with CHD.

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Contributors

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