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ASSOCIATION OF NUTRITIONAL SCREENING TOOL STRONGKIDS WITH ANTHROPOMETRIC PARAMETERS IN CHILDREN

ASSOCIAÇÃO DA FERRAMENTA DE TRIAGEM NUTRICIONAL *STRONGKIDS* COM PARÂMETROS ANTROPOMÉTRICOS EM CRIANÇAS

ASOCIACIÓN DE LA HERRAMIENTA DE CLASIFICACIÓN NUTRICIONAL *STRONGKIDS* CON PARÁMETROS ANTROPOMÉTRICOS EN NIÑOS

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RESUMO

Objetivos: descrever a prevalência de risco nutricional e verificar a associação da ferramenta de triagem nutricional *STRONGkids* com os índices antropométricos de peso para idade (P/I), estatura para idade (E/I) e IMC para idade (IMC/I) em pacientes pediátricos. **Método:** estudo transversal e analítico, realizado de abril a outubro de 2015, com 201 pacientes clínicos e cirúrgicos admitidos na enfermaria pediátrica de um hospital universitário no Nordeste brasileiro. A classificação do estado nutricional foi realizada por meio dos escores-z para os índices P/I, E/I e IMC/I e percentis para a circunferência braquial (CB). A ferramenta *STRONGkids* foi utilizada para determinar o risco de desnutrição. **Resultados:** a ferramenta *STRONGkids* revelou que 40,8% dos pacientes apresentaram risco moderado e 4,5%, alto risco para desnutrição. A *STRONGkids* teve associação significativa com a antropometria, uma vez que, quanto maior o risco nutricional, piores os índices antropométricos que avaliam desnutrição aguda e crônica. **Conclusão:** os resultados suportam o uso da ferramenta *STRONGkids* para identificar o risco nutricional em pacientes pediátricos internados, uma vez que a ferramenta mostrou associação com os parâmetros antropométricos de avaliação nutricional.

Descritores: Nutrição da Criança; Pediatria; Desnutrição.

ABSTRACT

Objectives: to describe the prevalence of nutritional risk and to verify the association of the nutritional screening tool STRONGkids with the anthropometric indices of weight to age (W/A), height to age (H/A) and BMI to age (BMI/A) in pediatric patients. **Method:** a cross-sectional and analytical study, carried out from April to October 2015, with 201 clinical and surgical patients admitted to the pediatric ward of a university hospital in the Brazilian

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Northeast. The classification of nutritional status was performed using the z-scores for the W/A, H/A and BMI/A indices and percentile for arm circumference (AC). The STRONGkids tool was used to determine the risk of malnutrition. **Results:** the STRONGkids tool revealed that 40.8% of the patients presented moderate risk and 4.5%, a high risk for malnutrition. STRONGkids had a significant association with anthropometry, since the higher the nutritional risk, the worse the anthropometric indices that evaluate acute and chronic malnutrition. **Conclusion:** the results support the use of the STRONGkids tool to identify nutritional risk in hospitalized pediatric patients, since the tool showed association with anthropometric nutritional assessment parameters.

Descriptors: Child Nutrition; Pediatrics; Malnutrition.

RESUMEN

Objetivos: describir la prevalencia de riesgo nutricional y verificar la asociación de la herramienta de clasificación nutricional *STRONGkids* con los índices antropométricos de peso para edad (P/E), estatura para edad (E/E) y el IMC para edad (IMC/E) en pacientes pediátricos. **Método:** estudio transversal y analítico, realizado de abril a octubre de 2015, con 201 pacientes clínicos y quirúrgicos admitidos en la enfermería pediátrica de un hospital universitario en el Nordeste brasileño. La clasificación del estado nutricional se realizó a través de las puntuaciones-z para los índices P/E, E/E e IMC/E y percentiles para la circunferencia braquial (CB). La herramienta *STRONGkids* se utilizó para determinar el riesgo de desnutrición. **Resultados:** la herramienta *STRONGkids* reveló que el 40,8% de los pacientes presentaron un riesgo moderado y un 4,5%, alto riesgo para la desnutrición. La *STRONGkids* tuvo una asociación significativa con la antropometría, ya que, cuanto mayor es el riesgo nutricional, peores los índices antropométricos que evalúan la desnutrición aguda y crónica. **Conclusión:** los resultados soportan el uso de la herramienta *STRONGkids* para identificar el riesgo nutricional en pacientes pediátricos internados, una vez que la herramienta mostró asociación con los parámetros antropométricos de evaluación nutricional.

Descriptores: Nutrición del Niño; Pediatría; Desnutrición.

INTRODUÇÃO

Malnutrition is one of the most important nutritional diseases in developing countries due to its high prevalence, socioeconomic losses, the relationship with infant mortality rates, but it has also been associated with increased morbidity and mortality, hospitalization time, and, finally, higher hospitalization costs.[1-4]

Several studies report a high prevalence of malnutrition in children's hospital admission, and 15 to 50% of children present worsening nutritional status during hospitalization, but there are still few studies published on this subject.[3,5-7]

Nutritional risk screening is a low-cost, non-invasive and easily applicable bedside method.[8] Although the early identification of nutritional risk through screening is a common practice in the clinical care of adults in children, it has been hampered by the lack of a suitable nutritional screening tool validated in Brazil.[9-

[11] These data highlight the importance of early identification of nutritional risk for adequate intervention.

Among STRONGkids screening tools has shown to be the most applicable because it is fast and can be performed by any trained health professional at admission, and consists of: subjective nutritional assessment, high nutritional risk disease or major surgery, nutritional intake and/or losses, weight loss or insufficient weight gain in the last weeks or months.[12-13]

STRONGkids has been chosen in clinical practice in Brazilian hospitals because it is easy and quick to apply (on average five minutes) and for presenting results compatible with objective data.[14] Thus, the present study aimed to describe the prevalence of nutritional risk in pediatric patients hospitalized in a university hospital and to verify the association of the nutritional screening tool STRONGkids with the anthropometric indices of W/A, H/A and BMI/A.

METHOD

A cross-sectional study was carried out with patients admitted to the pediatric ward at the Hospital das Clínicas of the Federal University of Pernambuco (HC-UFPE) during the period from April to October 2015. Patients of both sexes, aged between one month of age and 18 years, with a minimum of 24 hours of hospitalization. We excluded those whose caregivers did not know the information necessary for the screening tool, patients who needed intensive care, patients with special needs, recent abdominal surgery, diseases caused by inborn errors of metabolism, unable to perform the anthropometric evaluation, such as congenital heart disease. The study was approved by the Ethics and Research Committee of the Health Sciences Center of the institution with CAAE 41041014.0.0000.5208 / 2015.

The STRONGkids nutrient screening instrument was applied within 48 hours of admission. The questionnaire consists of four items: subjective nutritional assessment, high nutritional risk or major surgery, nutritional intake and/or losses, loss or insufficient weight gain in the last weeks or months. Each item was assigned a score of 0-2 points with a maximum total score of 5 points, being 0 points, 1-3 points and 4-5 points corresponding to low, medium and high nutritional risk, respectively.[13]

For the anthropometric evaluation, weight, height and arm circumference (AC) were measured at the time of admission or within 48 hours after admission, according to the techniques proposed by WHO (2008). The nutritional status was classified according to the z-score distribution curve for height / height for age (H/A), weight for age (W/A) and body mass index for age (BMI /A) indices. The cut-off points used in the classification of nutritional status were according to WHO criteria (2006 and 2007) 15 and z-score values were calculated with the help of WHO Anthro 2011 software, version 3.2.2.

The AC was measured to classify the muscular reserve, being low muscular reserve (malnutrition) percentile <5, within the mean between the 5 to 95 percentile and high percentile muscle reserve> 95 according to Frisancho (1990).[16]

The data was evaluated in SPSS, version 13.0. Continuous variables were tested for normality of distribution by the Kolmogorov Smirnov test. The variables with normal distribution were described in the form of means and the respective standard deviations. The variables with non-Gaussian distribution were presented as medians and their interquartile ranges. To verify the associations between the categorical variables, the chi-square test was applied. For comparison of means, ANOVA and Tukey post hoc analysis of variance were applied. The level of significance was 5%.

RESULTS

A total of 210 pediatric patients were collected in this study. However, nine volunteers were excluded because their weight and height were not measured during the first 48 hours of hospital admission. Thus, the study population was composed of 201 patients with predominance for males (58.7%) and mean age of 82.8±60.5 months.

Table 1 shows that among the main diseases that led to hospitalization were diseases of the respiratory system (16.91%), renal (11.44%), pediatric surgeries (11.44%).

Regarding socioeconomic conditions, the most prevalent family income was those receiving from one to two monthly minimum wages with 24.4% (n=49), followed by 22.3% (n=46) and 17.4% (n=35) who received a salary and less than a minimum wage, respectively. As for schooling of parents or guardians, only

14.43% (n=29) finished basic education (8 years), 30.85% (n=62) finished high school (11 years) and 10.9% (n=22) attended higher education (15 years).

Figure 1 demonstrates the nutritional risk of patients evaluated by STRONGkids. Patients who presented medium (n=81) and high risk (n=10) had as main reasons for hospitalization diseases of the gastrointestinal tract 6.97% (n=14), renal diseases 5.97% (n=12) , respiratory diseases 5.47% (n=11), endocrine diseases 5.47% (n=11) and pediatric surgeries 4.97% (n=10).

In relation to anthropometry the mean weight was 27.16 ± 18.2 kg, for height was 116 ± 33 cm and for BMI the mean was 17.86 ± 4.04 kg / m^2.

Table 2 shows that the prevalence of moderate and / or severe malnutrition (<-2 z score) was 13.0% (n=18), 10.9% (n=22) and 9.45% (n=19) for the W/A, H/A and BMI/A indices, respectively. For AC, malnutrition was found in 10.5%. Regarding weight loss observed at the time of admission, 23.9% (n=48) had a significant weight loss, with an average of 2.85 ± 2.72 kg per day.

The relationship between the Z score and the STRONGkids risk groups is described in table 3. It is observed that the higher the nutritional risk, the lower the Z score for the anthropometric indices W/A (p=0.00), the H/A (p=0.01) and BMI/A (p=0.00).

Table 1. Description of the demographic and diagnostic characteristics of patients pediatric inpatients.

Variable	Category	n	%
Sex			
	Male	118	58.7
	Female	83	41.3
Age (months)			
	≤ 60	90	44.8
	> 60	111	55.2
Diagnostics			
Orthopedic Surgeries		19	9.5
Respiratory diseases		34	16.9
Gastrointestinal disorders		17	8.5
Renal diseases		23	11.4
Endocrine diseases		15	7.5
Food allergy		07	3.5
Otorhinolaryngologist		03	1.5
Surgeries			
Pediatric surgeries		23	11.4
Urological diseases		02	1.0
Parasitic diseases		02	1.0
Dermatological diseases		17	8.5
Rheumatic diseases		07	3.5

Malnutrition		02	1.0
Hematologic diseases		07	3.5
Other diseases		23	11.4
Lenght of stay			
	<10 days	155	77.1
	≥ 10 days	46	22.9

Figure 1. Nutritional risk according to STRONGkids tool.

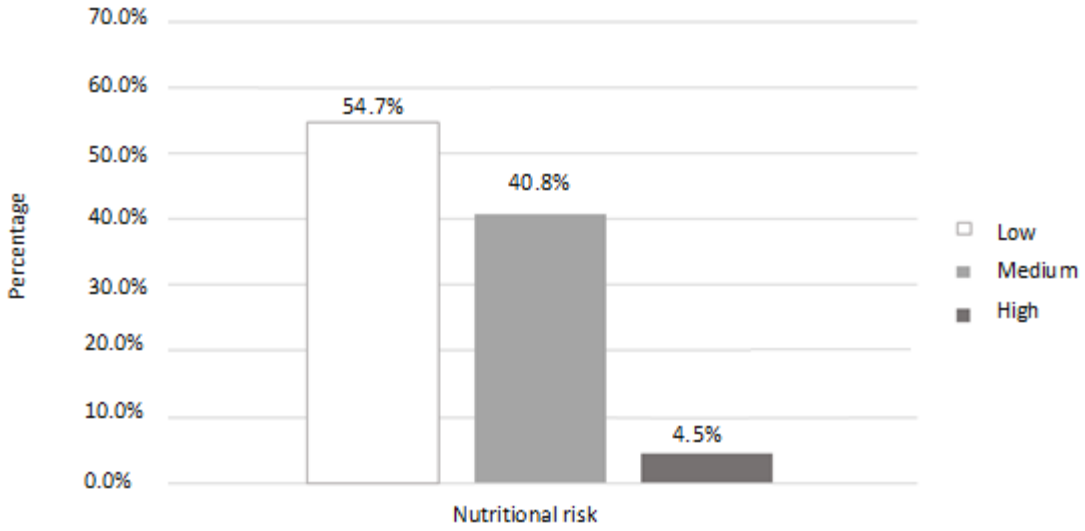

Table 2. Classification of nutritional status of hospitalized pediatric patients, according to Z-score WA, HA, BMI/Age and AC.

Anthropometry	n	%
W/A	138	
Very low weight for age (< Z -3)	05	3.6
Low weight for age (≥ Z -3 e < Z -2)	13	9.4
Appropriate weight for age (≥ Z -2 e < Z +2)	107	77.6
High weight for age (> Z +2)	13	9.4
H/A	201	
Very short height for age (< Z -3)	06	3.0
Low stature for age (≥ Z -3 e < Z -2)	16	8.0
Age appropriate height (≥ Z -2)	179	89.0
BMI/A	201	
Acute thinness (< Z -3)	04	2.0
Thinness (≥ Z -3 e < Z -2)	15	7.5
Eutrophy (≥ Z -2 e ≤ Z +1)	133	66.2
Risk of overweight / overweight (≥ Z +1 e ≤ Z +3)	27	13.4

Obesity (>Z +3)	22	10.9
AC	199	
Malnutrition (< p5)	21	10.6
Eutrophy (p5-p95)	151	75.9
Excess weight (>p95)	27	13.5

Table 3. Relationship between the Z score and the STRONGkids risk groups of hospitalized pediatric patients.

	STRONGkids Classification				
	n	Low risk	Medium Risk	High Risk	p
W/A (Score Z)	138	0.73±1.33[a]	-0.20±1.67[b]	-2.10±1.69[c]	0.00
H/A (Score Z)	201	0.12±1.46[a]	-0.42±1.70[b]	-2.13±2.13 [c]	0.01
BMI/A (Score Z)	201	0.90±1.50[a]	-0.23±1.74 [b]	-1.41±1.25 [b]	0.00

Different letters indicate significant difference in the post-hoc test (Tukey).

DISCUSSION

There is evidence that malnutrition leads to serious impairment in growth, increases morbidity and mortality, and may also be associated with behavioral and cognitive deficits in later childhood.[14,17] Malnutrition is common among hospitalized children but is often neglected or treated inadequately.[18] Therefore, the question of nutritional risk in hospitalized children and adolescents requires immediate attention from nutritionists and pediatricians.

During the last years, the incidence of nutritional risk in hospitalized children, evaluated by nutritional risk screening tools, has been verified in several countries. When compared with our findings, most of the studies described in the literature present higher percentages of nutritional risk than ours (4.5%),[17] analyzed 296 pediatric patients in Paris, and found that 44.3% of the children were classified as high nutritional risk, but with similar results for moderate risk 40.9%. Using STRONGkids evaluated a group of hospitalized children in the Netherlands and showed that 8% were at high risk and 54% were at moderate nutritional risk.[13] In Romania, with 271 patients hospitalized for clinical reasons, observed 23.7% of patients with high nutritional risk.[19] In the study in China with 1325 patients, hospitalized for surgical or clinical reasons, showed a prevalence of 9.1% for high nutritional risk.[14] In Italy, in 144 patients admitted for clinical reasons, demonstrated a 15% high risk of malnutrition.[20] In Turkey, with 494 pediatric patients hospitalized for surgical reasons, using the STRONGkids tool, presented results lower than ours with only 1.2% of the patients considered at high risk for malnutrition.[18]

Although this study was carried out in the northeast of Brazil, one of the less developed regions of the country, unfavorable socioeconomic conditions as well as the low level of schooling of parents or caregivers for children, the percentage of high nutritional risk found when compared to the literature is considered low. One of the possible explanations for this finding may be due to the reason for hospitalization, since most of the diseases are not directly related to nutritional status, in addition, the hospital where the research was carried out is not considered a reference for hospitalization and does not have an intensive care unit. In this way it restricts the hospitalization of more serious pathologies that could be more related to the nutritional risk.

Considering the association of the STRONGkids tool with the anthropometric parameters, it was observed that the higher the nutritional risk, the lower the Z score for the anthropometric indexes W/A, H/A and BMI/A. Similar results were observed that the increased risk of malnutrition was significantly associated with a higher prevalence of both acute and chronic malnutrition. Also demonstrated that the mean Z score for WA, HA and BMIA were significantly lower in children with high nutritional risk than those with low or moderate risk.[13-14,21]

In the validation study of the STRONGkids tool in the Netherlands in 2010, it was observed that it was successfully applied in 98% of hospitalized children in a multicenter study with 44 pediatric hospitals. In this study, the tool predicted and correlated the high risk with negative Z scores for the anthropometric parameters of nutritional evaluation in pediatrics, with greater weight loss, higher infection rates and prolonged hospitalization time.[13]

The use of any screening tool to identify children at risk of malnutrition can only be considered effective and reasonable if it results in early intervention and improved clinical outcomes. Larger and longitudinal studies in hospitalized pediatric patients appear to be necessary to investigate whether or not malnutrition will develop in patients classified as high risk of malnutrition through STRONGkids. However, the present study demonstrated that there was an association of the tool with the nutritional status indexes of pediatric patients and that more research should be performed to corroborate our findings, as well as correlation and validation studies should be developed to ensure safety of use of this tool for the hospitalized pediatric population.

CONCLUSION

It was verified that the tool STRONGkids can be useful and feasible to identify children and adolescents at risk of malnutrition in a pediatric hospital in the northeast of Brazil, since it was able to demonstrate an association between nutritional risk and anthropometric indices.

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