


Correlation between two tests and Children Health Assessment Questionnaire in child with rheumatic cardiopathy

Correlação entre dois testes e a pontuação do Child Health Assessment Questionnaire em crianças com cardiopatia reumática

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ABSTRACT | INTRODUCTION: Children who develop rheumatic heart disease live with limitations, they become commonly restricted in the performance of everyday activities. **OBJECTIVE:** To verify the correlation between performance between two submaximal exercise tests and the questionnaire score in children with chronic rheumatic heart disease. **METHODS:** A cross-sectional, descriptive and exploratory study with 15 children. They were evaluated through the submaximal tests, the 6MWT and TD3 and the physical capacity assessment under the caregiver's perception was performed through the application of the questionnaire of CHAQ. **RESULTS:** Mean age 13.7 years, standard deviation 1.9 years. Most of the companions were mothers, 66.7%, and a considerable portion of the caregivers had low socioeconomic and educational levels. The value obtained in the distance covered by the 6MWT demonstrated a low performance, median (interquartile range) 420 (101) meters, which was also observed in the three-minute step test, median (interquartile range) 68 (6.5) steps. Regarding the CHAQ questionnaire, there was an absence of impairment of physical capacity in view of the perception of those responsible with a final score of 0.1. The correlation between the questionnaire and the six-minute walk test (Sperman correlation = -0.21) and between the questionnaire and the three-minute step test (Sperman's correlation = -0.39). **CONCLUSION:** No correlation was found between submaximal tests, in relation to the physical capacity obtained through the perception of those responsible, assessed through the questionnaire. This result draws attention to the importance of the physiotherapist inserting submaximal tests in his clinical practice.

KEYWORDS: Rheumatic fever. Exercise test. Activities of Daily Living.

RESUMO | INTRODUÇÃO: As crianças que evoluem para cardiopatia reumática passam a conviver com limitações, tornam-se comumente restritas no desempenho de atividade do cotidiano. **OBJETIVO:** Verificar a existência de correlação entre o desempenho no teste de caminhada de seis minutos (TC6M) e do degrau de três minutos (TD3) e a pontuação do *child health assessment questionnaire* (CHAQ) em criança com febre reumática. **MÉTODOS:** Estudo seccional sem grupo de comparação, descritivo e exploratório, realizado com 15 crianças. Foram avaliadas através dos testes submáximos, o TC6M e o TD3 e a avaliação da capacidade física sob a percepção do cuidador foi realizada por meio da aplicação do CHAQ. **RESULTADOS:** A média de idade 13,7 anos, desvio padrão 1,9 anos. A maioria dos acompanhantes eram mães, 66,7%, e uma parcela considerável dos cuidadores apresentou baixo nível socioeconômico e de escolaridade. O valor obtido na distância percorrida através do TC6M demonstrou um baixo desempenho, mediana (intervalo interquartil) 420 (101) metros que também foi observado no teste do degrau de três minutos, mediana (intervalo interquartil) 68 (6,5) degraus. Em relação ao questionário CHAQ foi observado ausência de comprometimento da capacidade física diante da percepção dos responsáveis com escore final do questionário de 0,1. A correlação entre o questionário e o teste de caminhada de seis minutos (correlação de Sperman = - 0,21) e, entre o questionário e o teste do degrau de três minutos, (correlação de Sperman = - 0,39). **CONCLUSÃO:** Não foi encontrada correlação dos testes submáximos, em relação à capacidade física obtida através da percepção dos responsáveis avaliada através do questionário. Esse resultado chama a atenção para a importância do fisioterapeuta inserir na sua prática clínica, nesse perfil de pacientes os testes submáximos.

PALAVRAS-CHAVE: Febre reumática. Teste de esforço. Atividade.

Introduction

A chronic rheumatic heart disease (CRD) consists of a non-suppurative complication of rheumatic fever (RF), with uni or multivalvar involvement, which can cause severe heart failure¹. For lack of adequate guidance, these children become common restrictions, without performing basic daily activities².

Performance in daily activities is determined by the integration of various physical abilities and skills, and physical tests are used as essential tools for determining the functional profile, because, in addition to allowing the prediction of possible changes, they can be used to assess the effect of interventions^{3,4}. In this way, the assessment carried out properly by the physiotherapist aims to identify functional limitations, as well as to quantify the reflex of the disease on the activities of daily living³.

The measurement of functionality through some tests is part of the child's assessment, as they reflect daily activities, which are performed at submaximal levels of effort. Thus, submaximal functional tests have been proposed, which are based on activities of daily living and may reflect the level of functional capacity (FC)^{5,7}. It should be noted that these tests are highly applicable to children, especially due to the fact that the maximums are not always viable, in addition to providing greater risk⁸.

For an adequate approach to this population, it is essential that the physiotherapist evaluate and retain knowledge of the characteristics of the child's context, using the parents' impression as complementary information⁹.

One way to identify, in clinical practice, the aspects most influenced by a given health condition is through questionnaires, which can be useful to estimate the need for treatment and investigate the determinants of the health-disease process, however in the context of the pediatric population evaluation is carried out under the perception of the responsible person¹⁰.

Considering the importance of acquiring knowledge about these assessment methods, in this specific population, there is a need to verify the existence of a correlation between the performance in the six-minute walk test and the three-minute step and the score of the child health assessment questionnaire (CHAQ) in a child with rheumatic fever.

Method

Sectional study without a comparison group conducted with 15 patients diagnosed with rheumatic fever with a convenience sample, followed up at the cardiopediatric outpatient clinic of a reference hospital in Salvador.

The study was approved by the Research Ethics Committee of the Institute of Health Sciences of the Federal University of Bahia, called CEP / ICS, in 2015 with registration 395897146.6. 0000.5662. In the research, the term of assent was applied.

The study included children aged 8 to 16 years old, who were being followed up on an outpatient basis and who had not undergone any surgical procedure. All children were clinically stable, without fever, hemodynamic stability, without complex or potentially severe arrhythmias such as atrial / ventricular fibrillation, without implanted pacemakers. Without cognitive, neurological or orthopedic limitations, which include the instructions to perform the six-minute walk test (6MWT) and the three-minute step test (3MST), parents and / or guardians who have any limitations in answering the questionnaire.

Children, parents and / or guardians who did not understand the instructions for carrying out the proposed evaluations were not included in the study.

The variables studied were age, sex, education, if you have siblings, number of people per household, time of diagnosis at admission to the outpatient clinic, time of treatment, education of the person in charge, family income, distance walked on the 6MWT, number of steps on 3MST and child health assessment questionnaire (CHAQ) score.

The individuals were previously evaluated by the researcher and then the questionnaire developed by the researcher was applied and the tests were carried out by a blind evaluator.

The volunteers were submitted to the 6MWT according to the general criteria standardized by the American Thoracic Society (ATS)¹¹, that is, a previous 10 minute rest in the pre-test period with initial and final blood pressure measurements using the digital pressure device (TechLine®), heart rate (HR), peripheral oxygen saturation (SpO₂) by pulse oximeter (Contec ®) and subjective feeling of effort (Borg scale of 0 - 10 points) were measured before, during and after the test.

The 6MWT was performed in a 15-meter flat corridor, duly demarcated every three meters and each lap was considered complete when totaling 30 meters (round trip).

Functional capacity was assessed by the total distance covered at the end of each 6MWT, the distance traveled forecast was obtained through two equations of Brazilian references that are used for healthy individuals, a reference to the age group is 6 to 12 years $6MWT\ m = 145.343 + (11.78 \times \text{age years}) + (292.22 \times \text{height m}) + (0.611 \times \text{absolute difference in HR}) - (2.684 \times \text{weight kg})$ ¹¹ and the other comprising the age group of 13 to 84 years old from Iwana et al., 2009: $6MWT\ m = 622,461 - (1,846 \times \text{age years}) + (61,503 \times \text{Gender men} = 1; \text{women} = 0)$ ^{13,14}.

After 30 minutes, the child was submitted to 3MST, the step used was made of resistant wood with a non-slip material covering, in the following dimensions: 15 cm high by 40 cm deep and 60 cm wide. The child should perform 30 steps per minute^{6,7}.

The child was instructed to go up and down the step for three minutes, aiming at the greatest possible number of steps every minute (free cadence), being able to intercalate the lower limbs, without

the support of the upper limbs, which remained stationary at the along the body. For the analyzes, only the performance in the test (number of climbs in the step) was used. Vital signs were measured following the same assessment as the 6MWT.

The assessment of the parents perception of the child's functionality was carried out through the application of the CHAQ - Childhood Health Assessment Questionnaire, an adapted and valid version for parents 15 that measures functional capacity and independence in eight activities of daily living, estimating the degree of difficulty or limitations attributed to the disease on a scale of 0-3, with the highest values indicating less capacity.

In the present study, inferential statistics (statistical test or confidence interval) were not calculated given the impossibility of obtaining a reliable estimate of the standard error, since the sampling plan was non-probabilistic, and the patients were included in the study according to convenience criteria. of the researcher, criteria for scheduling appointments specific to the outpatient clinic and criteria for acceptance and eligibility of patients, thus there is no randomization in the selection process^{18,19}.

Results

The sample consisted of fifteen patients, the majority of whom were female (53.3%), with a mean age of 13.7 years, standard deviation (SD) 1.9, body mass index (BMI) of the children had a median (Interquartile range - IIQ) 18 (3.3) kg / m².

The children arrived at the clinic with a median time of diagnosis of six months (IIQ = 6 months), presenting a median (IIQ) 3.7 (3) years of follow-up until the collection period and all of them using benzetacil, every 21 days (Table 1).

Table 1. Clinical and epidemiological characteristics of children with rheumatic heart disease, Salvador, BA, 2015 (N = 15)

Variables	n (%)	Average (Variability)	Minimum; maximum
Sex			
Male	7 (46,7)	-	-
Female	8 (53,3)	-	-
Age (years)**	-	13,7 (1,9)	10,6 ; 16,8
Weight (Kg)*	-	42 (10,6)	-
Height (m)**	-	1,6 (0,1)	1,4 ; 1,6
Education			
Frequents	15 (100%)	-	-
DO not attend	0	-	-
Have brothers	15 (100%)	-	-
People per household **	-	4 (1,6)	2 ; 8
Diagnostic time on admission / months *	-	6 (6)	-
Treatment time until collection / years **	-	3,7 (3)	-

* Median (IIQ); ** Mean (SD)

Regarding the guardians who accompanied the child in the outpatient consultation, most of the sample consisted of mothers 66.7% and the families had low socioeconomic status with a predominance of wage income of up to a minimum wage 73.3% (Table 2).

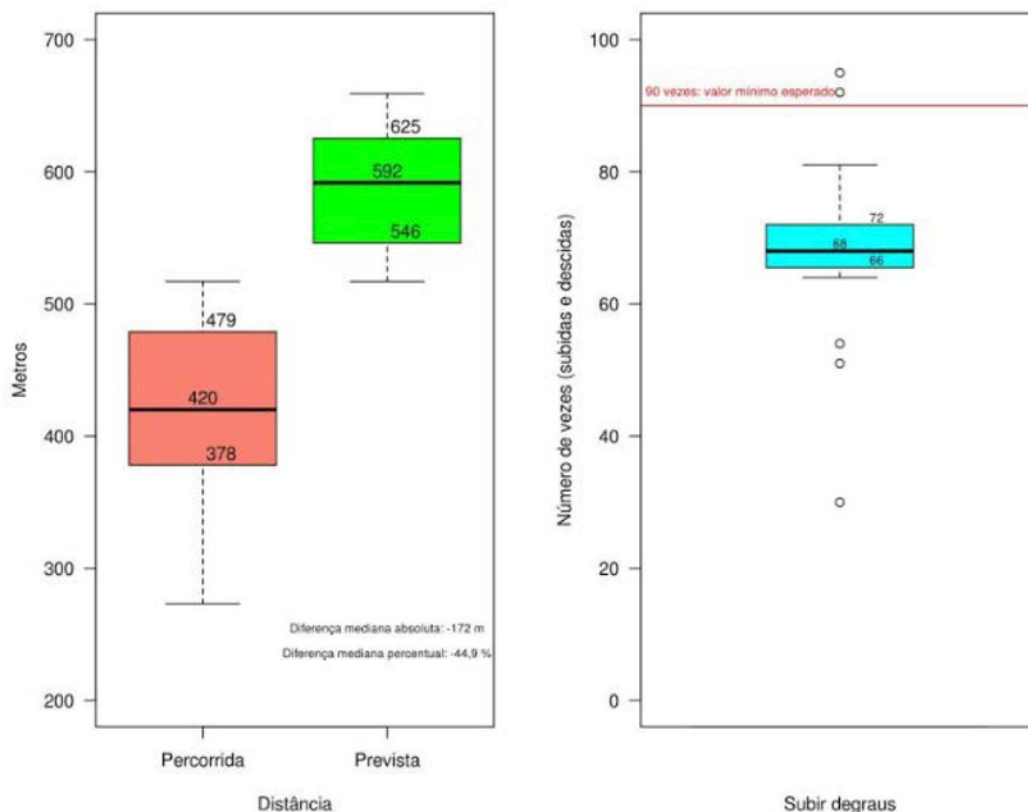
Table 2. Characteristics of the guardians of children with rheumatic heart disease. Salvador, BA, 2015 (N = 15)

Variables	n (%)
Responsible	
Mom	10 (66.7%)
Dad	3 (20%)
Others	2 (13.3%)
Responsible schooling	
Illiterate	2 (13.3%)
1st complete / incomplete	10 (66.7%)
2nd complete / incomplete	3 (20%)
Higher	0
Minimum wage income	
Less than 1 salary	1 (6.7%)
Up to 1 salary	11 (73.3%)
Up to 2 salaries	3 (20%)

All patients were evaluated by the 6MWT and the value obtained in the distance covered demonstrated a low performance, median (IIQ) 420 (101) meters. The predicted distance covered, obtained by the reference equation for healthy population, presented a median (IIQ) 592 (79,2) meters (Figure 1). However, three children interrupted the test before completing the six minutes, reporting fatigue in lower limbs (Borg 7- Very intense) and no children returned to the test after the interruption.

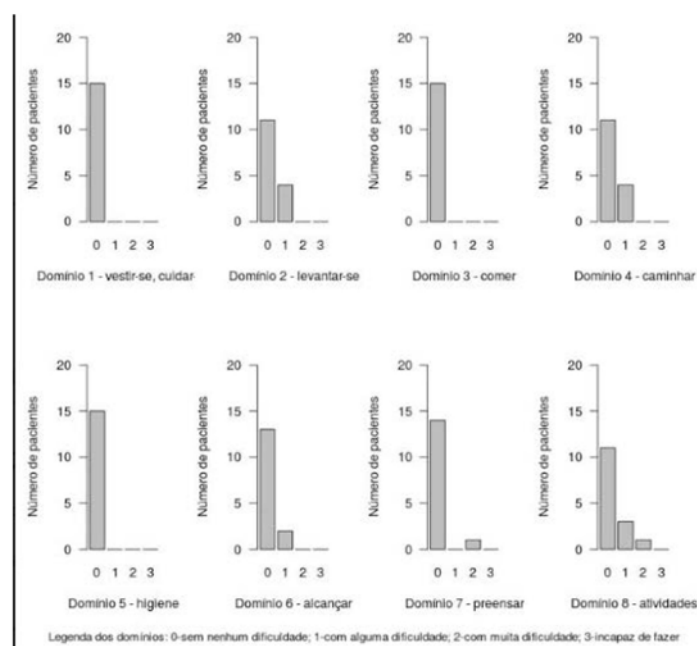
All children underwent the 3MST, the value obtained from the total of climbs and descents in three minutes demonstrated a low performance, median (IIQ) 68 (6,5), however, two patients had values greater than 90 climbs and descent at the end of the test.

Figure 1. Distance covered and predicted on the 6MWT of children with rheumatic heart disease. Salvador, BA, 2015 (N = 15)



In relation to the CHAQ items among the study population, in the fields of dressing and grooming, getting up, eating, walking, hygiene, reaching, catching and activities, all patients final score of 0,1, which corresponds to the absence of impairment of physical and functional capacity in the face of perception of those responsible. However, some guardians signaled the commitment of certain domains: getting up, walking, reaching, holding (catching) and activities, however this did not reflect results.

Figure 2. CHAQ items of children with rheumatic heart disease. Salvador, BA, 2015 (N = 15)



Discussion

The results of the present study showed a low correlation between the perception of caregivers, obtained through CHAQ and the submaximal tests, since caregivers assigned scores that indicated a good functional condition for patients, whereas the submaximal tests showed that the physical condition was lower than expected for the reference parameters.

Some factors may, at first, explain these findings. Perhaps, due to the fact that all children are being followed up on an outpatient basis, clinically stable from the point of view of the disease and living with other healthy siblings, it has made it difficult for the caregiver to identify the child's functional impairment, as seen in the results of the CHAQ questionnaire. In addition to these factors, the low level of education, socioeconomic status and the understanding of rheumatic fever by caregivers, may also have contributed to this condition.

In view of the other possibility that may have reflected in the CHAQ result, it is noteworthy that the mother constituted most of the companions in our study, also assuming the responsibilities for taking care of other children. Thus, their attention and assistance are dissipated and not concentrated only on those who have chronic rheumatic heart disease (CRC), since no child in the study had symptoms that required constant care. Similar findings were found in a study, which identified the mother, in the family context as an essential function in caring for children, who is able to define the needs of each child and who plays the main role of caregiver²⁰.

Another finding that drew attention was the aspect of the parents' education, as it can also present itself as an influence on the results, since a higher level of education and knowledge enables a different way in the perception of the disease and in the care of the child's health²¹. It is necessary to emphasize that there will be parents or caregivers with a low level of education who take better care of their children than others with a higher degree. However, what we intend to reflect on here is that, in general, a higher level of knowledge guarantees greater chances of early identification of changes resulting from the disease.

Some authors state in their study that approximately 10% of children with chronic illness suffer from some limitation in their daily activities²². In the present study, this condition was identified, when evaluating children through submaximal tests and, based on the results, it was observed that these children performed less than expected. Low physical performance was observed in a study that used the 6MWT to assess exercise tolerance and cardiorespiratory response. When comparing healthy individuals, cardiac patients walked shorter distances (472.5 m and 548.8 m, respectively)²³.

Another study found average values of distance covered, of 557m and 656m, in children with heart disease and healthy, above eight years old, indicating that children with heart disease have reduced physical capacity, when compared with healthy populations. The literature suggests that the type of effort during the 6MWT is similar to daily activity, since most of these activities are performed at a submaximal level of effort. Distance is believed to reflect daily physical activity better than maximum exercise tests^{12,24}.

In this study, during the 6MWT, three children interrupted the test before completing the six minutes, as they reported fatigue in lower limbs. A similar result was found indicating that children with heart disease, possibly, present greater damage to the global peripheral musculature, therefore, more related to the lack of muscle conditioning than to the respiratory response to exercise²⁵.

The findings suggest that the evaluation of the functionality obtained through the 6MWT, makes this submaximal test a safe tool to assess the of the FC in the population in question. What is surprising in the results found is that these patients, even submitted to an outpatient segment due to potentially fatal and / or disabling chronic conditions, the applicability of the questionnaire to caregivers was unable to identify, in the daily lives of these children, the reflection of the disease that was evidenced by the tests. These losses, observed in the physical capacity in the 6MWT, were also identified in the 3MST, as the children had a lower performance than expected, reinforcing the data found in the other test.

Some authors compared the 6MWT with 3MST, as measures of exercise tolerance, in 28 children, and the authors concluded that 3MST is easy to perform and well tolerated in children with severe chronic disease. In view of the results found in the present study, it is suggested that the step test may be an alternative to replace the walk test when there is not ample physical space for its performance, but further studies are still necessary for its standardization. In relation to the two patients in this study who showed good performance and showed values greater than 90 ascents and descents at the end of 3MST, despite not having reached the distance predicted in the 6MWT, they were the ones who performed better in the distance covered²⁶.

In view of the results found, with regard to submaximal tests, a strong correlation was observed between the distance covered and the number of climbs and descents, meaning that the individuals analyzed presented similar performances in the evaluation of the two tests. These results are in line with what was expected, since both propose to evaluate and predict the exercise capacity in the performance of activities of daily living, being also capable of allowing the early diagnosis of physical activity limitation.

These tests are considered as alternative forms, with the aim of assessing FC, monitoring the effectiveness of interventions, especially as parameters of response to rehabilitation programs and follow-up of physical therapy protocols, in addition to being able to direct treatment in an individualized way^{27,28}.

It is interesting to note that, through the findings of this study, it was possible to obtain information about the questionnaire as a tool to help health professionals understand and obtain information about the individual perception of each caregiver, in the context of living with the child with chronic disease. It was also possible to verify that the degree of subjectivity of an assessment increases as the investigated subject is not directly assessed.

Thus, care must be taken, since, in the pediatric population, responses by parents or caregivers are often accepted as reliable measures of health status and, in practice, decisions are made based on the opinion of caregivers. The limitation of this study is that the majority of patients in this study live in the interior of Bahia and outpatient follow-up is performed by semi-annual consultations and, in view of this condition, some patients did not attend the clinic on the scheduled days.

Conclusion

In view of the results obtained by the CHAQ questionnaire, it was observed that in view of the guardians' perception, the children did not have CF impairment, however, the reduction in tolerance to efforts was observed through submaximal tests, which found a reduction in the distance traveled through the 6MWT and the number of ups and downs on the 3MST indicating that there is no correlation between the perception of those responsible and what the patients actually present physically, seen in the tests. In view of these results, it is suggested that the interview with those responsible should be used in a complementary manner during consultations and not as a way to replace the detailed and individual assessment that must be performed on each patient.

Although submaximal tests are often not part of the evaluation routine of many physical therapists in the pediatric population, these tests can reflect the effects of the disease on activities of daily living, in addition to being easy to apply, low cost, well tolerated and used to establishment of prognosis based on prediction of morbidity and mortality. In this way, it is possible to establish a functional diagnosis and institute treatments directed to the specific needs of each child / adolescent, in addition to serving as a pre- and post-intervention parameter.

Author contributions

Mendes CMC participated in the conception, design, search and statistical analysis of the research data, interpretation of the results and writing of the scientific article. Carvalho FSG participated in the conception, design, interpretation of results and writing of the scientific article. Almeida SSM participated in the design and in the collection of research data. Santos JC participated in the design of the study.

Competing interests

No financial, legal or political competing interests with third parties (government, commercial, private foundation, etc.) were disclosed for any aspect of the submitted work (including but not limited to grants, data monitoring board, study design, manuscript preparation, statistical analysis, etc.).

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