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Elaboration and reliability of functional evaluation on going up and downstairs scale for Duchenne Muscular Dystrophy

Elaboração e confiabilidade da escala funcional do subir e do descer escada para Distrofia Muscular de Duchenne

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Abstract

Background: Instruments of functional evaluation for patients with Duchenne Muscular Dystrophy (DMD), available from the literature, are limited and scarce, making clinical decision on Physiotherapy difficulty. **Objectives:** To describe the process of creating a functional assessment scale in patients with DMD while going up and down the stairs, as well as to analyse the intra and inter-rater reliability of this scale. **Methods:** The scale development consisted of five stages: 1) to elaborate a script for directed observation based upon literature, 2) to describe a sequence of movements assessing 120 video recordings from 30 children (from 5 to 11 years) with DMD while going up and down stairs, 3) to elaborate a scale considering the degree of difficulty to execute the movements, 4) to create handbook, and 5) to submit both the scale and the handbook to be assess by 10 examiners, and review to create the final version. Both repeatability (researcher) and reproducibility (two independent examiners) were tested by using the IntraClass Correlation Coefficient (ICC) and Weighted Kappa respectively. **Results:** The scale encloses five phases for going up and four phases for going downstairs. Our results showed both excellent intra and intertester reliability, with values of Weighted Kappa ≥0.78 in all phases and ICCs≥0.89, with $p<0.05$ for all scores. **Conclusion:** The proposed scale showed excellent repeatability and reproducibility, requiring continuing the studies to assess its accuracy, validity and to create digital tools to improve data collection.

Keywords: Duchenne Muscular Dystrophy; evaluation; test reproducibility; physical examination; scale; children.

Resumo

Contextualização: Os instrumentos de avaliação funcional utilizados para pacientes com distrofia muscular de Duchenne (DMD), citados na literatura, são limitados e escassos, dificultando a tomada de decisão clínica fisioterapêutica. **Objetivos:** Descrever o processo de criação de uma escala de avaliação funcional do subir e do descer escadas, específica para crianças com diagnóstico de DMD, e examinar sua confiabilidade inter e intraexaminadores. **Métodos:** A construção da escala seguiu cinco etapas, a saber, elaboração de um roteiro para observação dirigida com base na literatura; observação do subir e do descer em 120 registros filmados de 30 crianças com DMD (5 a 11 anos); elaboração da escala, considerando o grau crescente de dificuldade de execução dos movimentos; criação do manual de preenchimento e submissão da escala e do manual a 10 examinadores, seguida de reajustes para criação da versão final. A confiabilidade foi testada pelo pesquisador (repetibilidade) e dois examinadores independentes (reprodutibilidade). Utilizou-se o Índice de Correlação Intra-Classe (ICC) e a Correlação de Kappa Ponderado. **Resultados:** A escala elaborada abrange cinco fases para o subir e quatro fases para o descer escadas. Encontrou-se excelente confiabilidade intra/interexaminadores, com valores da Correlação de Kappa Ponderado ≥0,78 em todas as fases e ICCs≥0,89, com $p<0,05$ entre todos os escores. **Conclusão:** A escala proposta mostrou excelente repetibilidade e reprodutibilidade, sendo necessária a continuidade do estudo com os objetivos de avaliar sua acurácia e validade e de construir uma ferramenta digital para otimizar a coleta de dados.

Palavras-chave: distrofia muscular de Duchenne; avaliação; reprodutibilidade dos testes; exame físico; escalas; crianças.

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Introduction

Duchenne Muscular Dystrophy (DMD) is a genetic disorder linked to the X chromosome, which affects about one in every 3,500 male children born alive[1]. Clinically, the DMD is characterized by a progressive and irreversible muscle weakness as a result of a deficiency or absence of dystrophin[1-3]. The functional impairment begins in the lower limbs (LL), with alterations in the angle of hip and knee joints, limitation in ankle dorsiflexion and weakness of the quadriceps muscle[4], characterizing a musculoskeletal deficit that compromise the functionality, such as going up and/or downstairs. The functional analysis of the going up and downstairs task over time allows monitoring of the disease evolution[5] in its different stages[6] and/or may be an indicative of the use of orthotics or wheelchair[7], and provides data that support the treatment course[8].

In physical therapy practice, the functional assessment is used along with the analysis of muscle strength and joint mobility. The quantification of muscle strength and range of motion does not allow adequate understanding of the functional impairments[4]. The child, even with loss of muscle strength and mobility, develop compensatory movements and postures that enable the performance of several activities. Faced with the presence of postural and compensatory alterations, the assessment through a functional evaluation scales provides more refined data.

Researches aiming the creation of scales considering the Brazilian population, as well as the validation of the translated ones[9], have been stimulated. Currently, the most used scales in Brazilian researches on muscular dystrophy are the Egen Klassifikation Functional Motor Scale (EK)[10], the Motor Function Measure (MFM)[11], the Barthel Index (BI)[12] and the Vignos Scale[7], being the last one of the oldest and most cited scales. The BI focus on the activities of daily living (ADL), the MFM, already validated for the Portuguese language, evaluates the static and dynamic functions, however the tasks evaluated present a certain complexity. The EK is specific for wheelchair users, and Vignos Scale provides a classification system score ranging from 0 to 10, that,the higher the score, the worse is the performance. Vignos, Spencer and Archibald[7], in 1963, had already considered the activity of going up and downstairs as an essential parameter in the assessment of the clinical stage of DMD. Therefore, these authors adopted a simplistic assessment system, which considered only four classification criteria, namely, climb stairs without assistance, climb stairs with assistance, climb stairs slowly with assistance and unable to climb stairs. The information obtained can be important as a disease classification, but still, this type of measurement is insufficient to provide data on the quality of the movements, which are fundamental to clinical decision-making in physical therapy practice.

Going up and downstairs are complex activities that require adequate synergism and muscle stability[13]. Kinesiological studies that quantify and describe these movements through scales are needed, in order to provide permanent and replicable data[14]. Research with normal children is limited to the analysis of falls during going downstairs[15] and in the learning process of going up and downstairs considering their age[16]. Considering the presence of pathology, the activities of going up and downstairs were described for children with sequel of cerebral palsy (CP) which were using orthosis[17].

The most comprehensive study regarding to the kinesiological description of the activity of going up and downstairs was published by McFadyen and Winter[18] in 1988, with the participation of normal adults, and it became a key reference for studies related to the topic and also for this study.

The study presented in this manuscript is part of a broader project that aims to create, to test the reliability, to investigate the correlations and to test the validity of functional assessment scales (focusing on four activities) designed specifically for children with DMD.

Going up and downstairs is a complex activity that is lost over the time by children with DMD, and the analysis of such activity may be an additional parameter to the methods of assessing these children. Therefore, the aims of the present study were to describe the process of developing a scale specific to the tasks of going up and down stairs for patients with DMD and to test its intra and inter-rater reliability.

Methods

This is an observational study approved by Ethics Committee of the Faculty of Medicine of the University of São Paulo (USP), São Paulo, SP, Brazil, process number 837/05, developed in the Laboratory of Physical Therapy and Behavior of the Physical Therapy Course of the School of Medicine, USP. The informed consent form was obtained by the laboratory of Myopathies from the Biosciences Institute of USP, under the responsibility of the professor Mayana Zatz. The consents allowed the development of an audiovisual database used only for research purpose. The availability of these images allowed the achievement of the present research.

The materials used were limited to television, a video cassette recorder, chronometer and 30 movies (120 records) of children with DMD performing functional activities, which included the activities of going up and downstairs.

Procedures

Scale Construction

Sample

The sample used in the construction of the Functional Evaluation Scale (EAF) was composed of 30 children with DMD, video recorded four times (every three months from the first recording), in a period of one year, totalizing 120 records of the movement of climbing stairs and 120 records of the movement of going downstairs. The videotapes were provided by the database of the Laboratory of Myopathies of the Institute of Biosciences from USP. The mean sample age was 7.1 (±2.2 years old), according to information collected from medical records.

The activity studied was filmed in a standardized rehabilitation stair, composed of six steps on one side (10 cm height x 27 cm wide, where the children had ascended the stairs) and four steps on the opposite side (17 cm height x 25 cm wide, where children had descended the stairs). The camera was positioned 3 meters away, alongside to the stairs, allowing the observation of both movements.

The scale proposed in this study was created to be used from the footage of the activity. The option for this type of data collection was due to the purposes of researching a permanent material that permit repetitive and comparative evaluation without overloading the children. The analysis of the films also allows considerations of clinical aspects and on movement quality[19].

Stages of scale creation

The scale was developed following five stages.

The first stage comprised in the development of a script including the sequence of movements commonly used in the activities of going up and downstairs, developed according to the study published by McFadyen and Winter[18], that described these activities using, as research method, the electromyography analysis.

This script was used, posteriorly, in the second stage to standardize the observation and the data collection concerning to the movements performed by the 30 children with DMD in the 120 video records of the activities of going up and downstairs. Thus, it was possible to standardize the observation of the body segments positions (i.e. feet, knees, hips, trunk, upper limbs (UL), cingulum membri superioris, cingulum membri inferioris and head), being this observation compared with the expected normal movements, previously listed and described in the script.

In the third phase, based on the registers obtained in the observations, the movements sequence was organized. Firstly, categories of movements per body segments were created. Next, the categories found were arranged in an ascendant level considering the degree of difficulty to execute the movements. Then, a score was established for each category of movement found, considering the degree of difficulty of performance by children with DMD, which occurs due to the presence of deformities, shortenings and muscle weakness consequent from the disease's evolution. Therefore, a preliminary scale was elaborated and refined in subsequent stages of the instrument development.

The fourth stage consisted in the production of the handbook for data collection of the proposed scale, which described, in details, the process of filming; the movements to be observed, considering each body segment; the scoring method for obtaining the final score for the going up and downstairs; and the method to collect the time spent by the children to perform the activities[20].

With the scale and the handbook developed, in a fifth stage, both were submitted to assessment by ten independent examiners (doctors and physical therapists), recruited according to the prerequisites suggested by Fehring[21]; in the case of this study, clinical experience in pediatrics and with DMD, with a minimal degree of master and an article in this field published in a scientific journal. For the assessment, a questionnaire was elaborated comprising aspects of aesthetic and technical quality, and of language adequacy and clarity. Relevant and viable suggestions were incorporated and the final version of the Functional Evaluation on Going up and downstairs Scale (EAF) and its handbook were created.

Data collection for the reliability analysis of the EAF

The EAF was submitted to the analysis of the intra and interrater reliability. To perform these analyses the first 30 video records (first assessment) of each child performing the going up and down stairs were used.

The repeatability was obtained by comparing three distinct assessments of the same video record, performed by the investigator in different days (minimal interval of four weeks) to avoid memorization of the results[22].

Reproducibility was analyzed with the participation of the investigator and two independent examiners (physical therapists), without previous training, recruited according to the criteria suggested by Fehring[21]. The assessments were conducted in different laboratories to avoid the knowledge of the results, as proposed by Iunes et al.[22].

Data collection of the performance time of the sample

The going up and downstairs were performed under a simple verbal command that required the highest possible speed, and the time spent to perform the task was measured after the second attempt. The time spent in each recording was

patient-dependent, varying according to the comprehension and collaboration of the child. The time spent for going upstairs was measured from the moment that the child was positioned facing the stairs, after the start command, until touching both feet on the floor at the top of the stairs. The time spent for going downstairs was measured from the moment that the child stopped at the top of the stairs and was asked to go down, until touching both feet on the ground. Three data collections were performed and, for study purposes, we used the measure of the time spent that was repeated or the average of time spent that were more similar each other, both for the going up and the going downstairs.

Statistical analysis

For mathematical treatment and statistical analysis of the data, the programs Excel 2003, Minitab v. 14 and Statistica v. 8, MedCalc® 9.6 were used. The descriptive analysis used to describe the general characteristics of the sample was performed with the calculation of the means and standard deviations.

First of all, the normality of each variable was tested through the adherence test – Shapiro-Wilk. After verified the absence of normality for some variables (time for going up/down stairs), non-parametric tests were performed.

For the analysis of correlation of the dependent variables (going up score/going up time, going down score/going down time), the Spearman's Correlation Coefficient was used. For the comparison analysis between the time taken to go up and down, the Wilcoxon test was used. It was considered as high correlation values ≥0.82 for both tests used and the level of significance was set at $p<0.05$.

For the reliability analysis, since the correlation coefficients do not take into account the random probability of concordance, the Weighted Kappa Correlation and the Intraclass Correlation Coefficient (ICC) were used to verify the intra and inter-rater reproducibility of the method of evaluation proposed.

For the reliability analysis of the qualitative ordinal variables (score of each phase go up/go down), the Weighted Kappa[23] was used, since the data produce categorical ordered measures (classificatory) as a diagnostic method according to certain criteria. The values from 0.21-0.40 were considered as indicative of poor reliability; from 0.21-0.40, fair reliability; from 0.41-0.60, moderate reliability; from 0,61-0,80, substantial reliability and the values above 0.81 were considered as excellent reliability.

For the assessment of the reliability from the total scores of going up and downstairs, in other words, quantitative variables, discrete or continuous numbers, it was used the ICC type 3,1 for the intra-raters and the type 2,1[24] for inter-raters analysis. There were considered the values of ICCs<0.70 as not acceptable; 0.71<ICCs<0.79, as acceptable; 0.80<ICCs<0.9, as very good and ICCs>0.90, as excellent. The significance level was set as 5%.

Results

Characteristics of the EAF

The EAF was, with a didactic purpose, divided in two parts: one for the going up and another for the going downstairs and each part were again sub divided in phases composed by different items, considering the segment to be observed. The functional activity of going up stairs was divided in five phases (preparation phase, propulsion phase, swing phase, stance phase and phase of the swinging LL) (Appendix 1) and that of going downstairs was composed by four phases (preparation phase, propulsion phase, swing phase and stance phase) (Appendix 2). The minimal score for the scale, both for going up and downstairs, is zero and the maximal is 43 points. To obtain the final score, the scores from each phase are summed. The lowest score represents the best performance in the activity studied.

The scale allows the registration of postural compensations that are not included in the evaluation criteria established. The presence of these extraordinary compensations interferes on the final score.

For the scale administration, the child must be filmed while going up and downstairs, and a previous training of the examiner and the filling of the handbook are necessary.

Genneral characteristics of performance

The means found on EAF – going up were 16.7±8.44 and on going down were 16.8±8.57. The means of each phase of the going up were 2.4±51.45 (phase I), 5.5±22.03 (phase II), 1.7±41.36 (phase III), 1.6±39.22 (phase IV) and 2.8±28.66 (phase V), and the means of each of the going down phases were 2.4±41.33 (phase I), 4.03±59.82 (phase II), 4.3±12.83 (phase III) and 2.4±45.36 (phase IV). The mean time taken for going up was of 11.2±10.7 seconds and, for going down was of 11.1±13.4 seconds.

Reliability analysis

The reproducibility of the going upstairs had shown, for all phases, excellent classification. In phase I, there was found K=0.91±0.07; in phase II, K=0.96±0.02; phase III, K=10±0; phase IV, K=0.96±0.04 and, in phase V, K=1.00±0. The reproducibility

of the going downstairs phases had shown values of Weighted Kappa of 0.8±0.10, 0.85±0.09 and 0.92±0.05, respectively for the phases I, III and IV, values classified as excellent, showing a value of 0.79±0.22 only for the phase II, with classification of substantial reliability.

The repeatability of the going upstairs presented excellent classification in the phases I, II and III, with values for the Weighted Kappa of, respectively of 0.81±0.07, 0.94±0.03 and 1.0±0. In the phases IV and V, the concordance had shown to be substantial, with values of 0.78±0.14 and 0.79±0.11, respectively. For the analysis of the phases of going downstairs, the values of Weighted Kappa for the phases I, II, III and IV were, respectively, of 0.94±0.04, 1.0±0 1.0±0 and 1.0±0, being all classified as excellent.

The analysis of the going up and downstairs phases had shown excellent reliability in the study of the reproducibility as well as for the repeatability, according to the ICC found. The values of ICC for reproducibility were of 0.94 and 0.91 for going up and downstairs respectively. The repeatability had shown ICC of 0.92 and 0.89, for going up and downstairs respectively. The p values, for all analyses were below 0.05.

Correlation analysis

All the correlations found were positive, obtaining a value of 0.82 (p=0.001) between the going up time and the EAF-going up; 0.66 (p=0.001) between the going down time and the EAF-going down and, between the going up and going down times a value of 0.90 (p=0.368) was found.

Discussion

Descriptive reports are used as assessment methods in physical therapy clinical practice and, normally, take too much time, are long, do not have standardization, are poorly replicable and hard to compare. Considering this, scales similar to the EAF may provide an interesting support and optimize this task.

Measuring muscle strength is a common procedure in the assessment of DMD, however, strength by itself is not an indicator of motor performance[6,25,26]. The execution of a certain motor activity depends not only of muscle and joint integrity, but also of the capacity to develop compensatory movements which minimize these dysfunctions[26,27]. In the Center for Studies of the Human Genome of the Institute of Biosciences from USP, the clinical observation of children with DMD whom, by myometry, presented about 40% of the strength expected for the majority of the muscles assessed, considering gender and age and, even so, had gait and used UL for most of the ADL tasks. On the other hand, it was possible to find children with 60% of the strength expected, and wheelchair users. Our findings corroborate the findings from Beenakker et al.[6], whom stated that functional tests are more sensible to assess DMD progress when compared to strength quantification.

The elaboration of scales for functional assessment is necessary, especially considering that the emergence of new drugs, associated to physical therapy intervention, are increasing life expectancy and quality of life among people with dystrophies. However, the greatest difficult found during the instrument creation is the scarcity of similar scales, which assess the going up and downstairs specifically for the DMD, making difficult its comparison and validation. Some of the scales for functional assessment used in the evaluation of DMD, as the EK[10], for example, that aims to quantify the level of functional impairment on DMD, are specific for wheelchair users. The BI[12] is a tool cited as satisfactory to assess motor function of children with DMD, but with the focus to measure the subject's level of dependence. The activity is stairs is evaluated in this scale in three ways: unable, needs support or are able to perform independently. For practical purposes, they help to orient and to address patients regarding their ADL, but they do not support decision-making about physical therapy intervention itself.

The Vignos, Spencer and Archibald[7] scale, widely used in medical clinic, translated to the Portuguese in different non-validated versions, is a tool that aims to establish specifically the DMD staging. It only classifies grossly LL functionality (climb or walk with or without support, slowly with support or do not perform the task), do not measure the motor changes shown in these activities, differently from the EAF, which analyses in detail the going up and downstairs. Another scale that assesses functionality is the MFM. The MFM[11] is a scale that evaluates the transferences in different postures and the global functionality both for the UL and LL. This is a open and complex scale, in opposition of the EAF, which assesses a specific function in a detailed way, allowing the information generated to be used objectively.

MFM reliability, measured by the Weighted Kappa, presented values between 0.81 and 0.94, while the EAF had estimates between 0.78 and 1.00. The ICCs of the MFM analyses had showed estimates intra and inter-rater between 0.96 and 0.99, while the EAF, estimates between 0.89 and 0.94. The EAF had show to be as reliable as the MFM, in the repeatability and reproducibility.

The going up and downstairs times were analyzed and suggested as evaluation parameters for Vignos, Spencer e Archibald[7] and Brooke et al.[28]. In the population studied, only the going up time presented strong correlation with the going up scores, the same did not occur with the going down

score and time, result that may be justified by the easiness to go downstairs when compared to the going up[18]; because, when climbing the stairs, muscle requirement is anticipated and, when descending, is delayed. The times taken were not greater for children with worst performance scores (greater) during the going down.

The times considered in isolation seems insufficient to show the disease progression in this population, once muscle weakness determines compensatory movements not considered in this variable's measurement; in contrast, the going down score do not miss its importance, since falls are common in stairs and are considered one of the main causes of accidents in general population[29]. It is responsibility of the physical therapist to recommend the use of support or help during the going down or even the impossibility to perform this activity.

The sample of 120 records, evaluated with basis in a script previously created, allowed the creation of a stratified scale, which assesses the misalignments and functional compensations of the UL, LL, trunk and head during the going up and downstairs. The accuracy found in our analyses may be explained by the examiners' experience with such population.

Studies on the activities of going up and downstairs, performed in adults, presented approaches for developing protheses[30] and for evaluating athletes[31]. These studies used sophisticated instruments, such as electromyography, kinematic analysis and force platforms, which are useful and accurate, but not always available. The instrument created in the present study provides data for comparison, measurable without excessive waste of time, with a low cost and that can be assessed easily by encouraging its use in clinical practice.

After the creation of the scales by activity and the administration of the reliability tests, they shall be submitted to validation, in other words, to the comparison of the data obtained with a gold standard instrument, probably the kinematic. Posteriorly, the necessary corrections will be performed, and, if necessary, a software will be created to optimize data collection and the elaboration of reports, including those that shall compare data collections obtained in different moments. Only after these procedures, it will be possible to test the scale's sensibility to detect functional changes in periods of three, six and 12 months.

In spite of being a long research, it is crucial and has clinical relevance, since it would directly benefit patients, once this provides methods for a quick assessment, generates clear and objective information and makes possible a more targeted and personalized care.

Conclusion

In the present study, the process of creating a scale was described, together with the construction of a detailed scoring protocol of the going up and downstairs for children with DMD, which allows the calculation of a final score, useful for comparisons of performance among this population. Such methodology can be replicated in other studies.

The analyses performed had shown that the EAF presented correlation with the going up time, but not with the going down, results that may be justified by the presence of compensatory mechanisms that, in association with gravity, may accelerate the going down in a dangerous way.

Considering reliability, the preliminary results were promising, but future studies should explore the clinical applicability of the scale proposed.

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Appendix 1

Functional evaluation scale of going upstairs for DMD

			X	Body compensations	Notes
1. PREPARATION PHASE - ORTOSTATISM					
Equinus foot present ( ) 1 pt absent ( ) 0 pt	Wide base of support present ( ) 1 pt absent ( ) 0 pt	· without support	0	Observations:	
		· one hand support	1		
		. two hands support	2		
		. one forearm support	3		
		. two forearms support	4		
	Perform movements of body compensation	present absent	Add one point for each compensation		
2. PROPULSION PHASE					
Head flexion present ( ) 1 pt absent ( ) 0 pt Head extension present ( ) 1 pt absent ( ) 0 pt Lumbar hyperlordosis present ( ) 1 pt absent ( ) 0 pt	Trunk flexion present ( ) 1 pt absent ( ) 0 pt Trunk extension present ( ) 1 pt absent ( ) 0 pt Trunk rotation present ( ) 1 pt absent ( ) 0 pt Trunk lateral flexion present ( ) 1 pt absent ( ) 0 pt	·without support	0 pt		
		· one hand support	1 pt		
		. two hands support	2 pt		
		. use both hands to push the body	3 pt		
		. one forearm support	4 pt		
		. two forearms support	5 pt		
	Perform movements of body compensation	present absent	Add one point for each compensation		
3. SWING PHASE – PELVIS					
PELVIS Hip flexion present ( ) 1 pt absent ( ) 0 pt Hip internal rotation present ( ) 1 pt absent ( ) 0 pt	Hip external rotation present ( ) 1 pt absent ( ) 0 pt Unilateral pelvic elevation present ( ) 1 pt absent ( ) 0 pt	Knee flexion in swing present ( ) 1 pt absent ( ) 0 pt Hip abduction present ( ) 1 pt absent ( ) 0 pt	Foot in dorsiflexion in swing present ( ) 1 pt absent ( ) 0 pt		
4. SWING PHASE – LL					
LEG Foot in swing develops support slowly over the step (groping) until positioning the entire foot is positioned. present ( ) 1 pt		Ankle in swing in extension present ( ) 1 pt absent ( ) 0 pt The foot touches the step many times before completing the movement present ( ) 1 pt			
5. STANCE PHASE					
The foot shows stability present ( ) 1 pt absent ( ) 0 pt Uses feet in alternation present ( ) 1 pt absent ( ) 0 pt	Stable and erect trunk present ( ) 1 pt absent ( ) 0 pt	Unstable or hyper-extended knees ( ) 2pt			
Wide base of support ( ) 1pt	Goes upstairs pausing in each step ( ) 1pt	Choose a leg to go up without success ( ) 1 pt			
TIME FOR GOING UP	(seconds)			TOTAL SCORE	

Pt=points.

Appendix 2

Functional evaluation scale of going downstairs for DMD

			X	Body compensations	Notes
1. PREPARATION PHASE – ORTOSTATISM					
Back hyperlordosis ( ) 1 pt	Wide base of support present ( ) 0 pt absent ( ) 1 pt	· without support	0 pt	Observations:	
		· one hand support	1 pt		
		. two hand support	2 pt		
		. one forearm support	3 pt		
		. two forearms support	4 pt		
	Perform movement of body compensation	present absent	Add a point for each compensation		
2. PROPULSION PHASE					
Head Flexion ( ) 1pt Head Extension ( ) 2pt	Trunk Flexion ( ) 1 pt Trunk Rotation ( ) 1 pt	· without support	0 pt		
		· one hand support	1 pt		
		. two hand support	2 pt		
		. wrists support	3 pt		
		. forearms support	4 pt		
		. support using the knees	5 pt		
		. support using the shoulders	6 pt		
	Perform movement of body compensation	present absent	Add a point for each compensation		
3. SWING PHASE					
HIP Hip Flexion present ( ) 0 pt absent ( ) 1 pt Hip internal rotation present ( ) 0 pt absent ( ) 1 pt	Hip Extension present ( ) 0 pt absent ( ) 1 pt Knee in swing in flexion present ( ) 0 pt absent ( ) 1 pt	Unilateral hip elevation present ( ) 0 pt absent ( ) 1 pt Knee in swing in extension present ( ) 0 pt absent ( ) 1 pt	Foot in swing in dorsiflexion present ( ) 0 pt no present ( ) 1 pt		
Contacted of the foot in swing Equinus foot present ( ) 0 pt absent ( ) 1 pt		Lower limb touches the step once ( ) 0 pt Lower limb touches the step more than once until reaches stability ( ) 1pt			
4. STANCE PHASE					
Support of the feet stabilized in the step present ( ) 0 pt absent ( ) 1 pt	Equinus feet support present ( ) 1 pt absent ( ) 0 pt	Feet support with knee flexion Present ( ) 0 pt Absent ( ) 1 pt Feet support with extension or hyper-extension of the knees present ( ) 2 pt absent ( ) 0 pt			
Goes downstairs using only one foot to move forward ( ) 1 pt Descend using both legs ( ) 0pt	Pauses in each step of the stair ( ) 1pt	Goes down the steps hopping, with one or two lower limbs ( ) 1pt Perform trunk rotation when going downstairs ( ) 1pt			
GOING DOWNSTAIRS TIME	(seconds)			FINAL SCORE	

Pt=points.