ORIGINAL ARTICLE

Quantitative sports and functional classification (QSFC) for disabled people with spasticity

M A Khalili

M A Khalili
Semnan University of
Medical Sciences, Iran

Correspondence to:
Dr Mohammad
Amouzadeh Khalili,
Semnan University of
Medical Sciences,
Damghan RD, Semnan
35198, Iran;
moh35ir@yahoo.co.uk

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Although sports classification for cerebral palsy has been in use for several years, it is complicated both for training and for scoring. People with cerebral palsy are difficult to fit into classification systems that are appropriate for other disability groups. The aim of this report is to describe the development of a framework for a simple quantitative classification of cerebral palsy. It was designed to be easily understood by all who are investigating, treating, training, coaching, and working with spastic disabled people. The scoring system is accurate and quick, so long as the definitions of items listed are adhered to.

Accurate assessment and classification of disability is one of the most important aspects of management. The assessment should always be based on documentation of what the subject is able to do. Techniques and scales are now widely used to assess and classify functional ability.^{1–3}

A technique using an apparatus to evaluate spasticity was suggested by Marchese,⁴ but this is not commercially available in many areas.

In disabled sports, medical classifications have been used for disabled athletes to adjust for different degrees of physical capacity and make competition more equal. The classification systems ensured that disabled athletes of the same group compete as far as possible under conditions of equality.⁵ One of the classification systems used is specifically for athletes with cerebral palsy. In this classification there are eight classes, from class 1 (severe involvement) to class 8 (minimal involvement). Classes 1 to 4 are for wheelchair-bound competitors, and classes 5 to 8 are for ambulant competitors. "This system measures the innate neurological function of sports person in relation to his/her sport event in a way that will allow for competition against those with similar degrees of neurological involvement".⁶ This method of classification is based on the movement quality of people with cerebral palsy. Although the technique of evaluation appears to be comprehensive, it does not readily fit in with the classification systems used for other disability groups,⁷ and its training requirements are complicated for non-medical staff. Some countries may have very few people who are qualified to use the system.⁸ It is clear that a measurement must be valid, reliable, responsive, and simple to use in clinical evaluation.⁹

One of the major problems has been to standardise and scale a simple and suitable technique or instrument for quantitative functional evaluation of people with spasticity, particularly in disabled sports areas. The aim of this report was to establish a framework for such an evaluation, the quantitative sports and functional classification (QSFC), which can easily be understood by all who are investigating, treating, training, coaching, and working with spastic disabled people and can be scored accurately and quickly by anyone who adheres to the definitions listed below. The profile is defined in full in tables 1, 2, and 3.

Scoring for each component is based on joint function and motion. The range of scoring for each desired movement is from 0 (no function) to 3 (normal function).

The sum scores for each limb are then summed to give an overall measure of skilled function. Finally, the disabled competition class is determined by referring to table 4. The QSFC profile can range from a low of 0 to a high of 138; the higher the score, the more independent the subject. A score of 138 represents a normal person.

THE QSFC CLASSIFICATION

The classification has the following objectives:

- To determine the level of potential functional ability.
- To simplify the classification of sports competitors with cerebral palsy using functional quantitative measures that fit in with other classification systems.
- To allow an evaluation of improvement—that is, to enable the profile to be used in treatment programmes in clinical and research centres.
- After a trial period of use in sports or other centres, and modification if necessary, it should facilitate the classification of disabled people taking part in sports and research projects, and the transfer of cases within the medical and paramedical professions.

DESCRIPTION OF THE TEST

This assessment consists of 26 items (tables 1–3), and most attention has been paid to the evaluation of movements that are affected by spasticity. The tests are based mainly on the posture and movement patterns that are required in sports and activities of daily living. According to Sherrington, posture accompanies movement like a shadow; every movement begins in posture and ends in posture.¹⁰

The test must be carried out under similar condition for a group of patients—that is, posture, emotional state, and test instruments (balls, transfer surface, fine items) must be the same.

The subject must be able to cooperate with simple instructions. If sensation, particularly kinaesthetic sense, is thought to be impaired, a simple verbal explanation is given initially and the required movement can be shown by moving an unaffected limb through the required range.

When the patient moves, the pattern of movement must be observed at all the joints, based on the instruction and guidelines provided.

If the test does not reveal spasticity, the movements are repeated actively and passively several times.

Techniques of performing the tests

The following tests are used:

Transfer: the individual transfers the body laterally from one place to another while in the sitting posture—for example, transferring from chair to bed.

Touching behind the head: the palm must touch the back of the head.

Combination movement (shoulder abduction with elbow extension and supination): an antispasticity movement pattern is required—for example, in hemiplegia with flexion contracture in the elbow, the combination movement will be shoulder abduction, elbow extension, forearm supination, and wrist and finger extension.

Kicking/thrusting with the foot: wheelchair bound subjects must thrust the legs as far as they can; standing subjects must kick a ball.

Control of foot rest: remove foot from rest, put down on the ground and back.

Leg abduction: subject stands up, lower limbs together; examiner throws a ball and subject must abduct a leg to allow the ball to pass through.

Scoring

Each item is rated on four different levels. It is important to observe what the patient actually does and how much of the task is done. The general description of each level is as follows:

Grade 3—Normal function: the movement is done safely and on time.

Grade 2—Good function: mild spasticity, the patient perform at a level of more than 70%.

Grade 1—Poor to fair function: the patient performs at a 30–70% level, with moderate spasticity.

Grade 0—Very poor movement with severe spasticity, but sufficient for a target function: the patient performs at a level of less than 30%, or no movement is possible because of tonic reflexes or spinal reflexes.

GUIDELINES FOR SCORING

When there is normal function and the movement is done safely and on time, the score is 3.

Trunk

Static trunk balance

- 2 Good balance
- 1 Poor to fair balance
- 0 No balance

Dynamic trunk balance

- 2 Good balance during prowling in wheelchair and throwing
- 1 Poor to fair balance during prowling in wheelchair or a throwing motion

Table 1 Trunk assessment

1. Static trunk balance
2. Dynamic trunk balance
3. Touching the legs by hands (trunk flexion)
4. Back to sitting position from flexion
5. Trunk rotation
6. Pick up a ball from right/left side
7. Sum

Table 2 Upper extremity assessment

Movement pattern	Right	Left
1. Appearance		
2. Prowling wheelchair		
3. Lateral transfer		
4. Touching behind the head		
5. Shoulder abduction, elbow extension, supination		
6. Throwing a ball (overarm)		
7. Throwing a ball (underarm)		
8. Grasp and release		
9. Open and close a clothes peg and a zip		
10. Fasten and unfasten shoe lace		
Sum		

- 0 No balance during prowling in wheelchair or during a throwing motion

Touching the legs with hands/back to sitting position from flexion

- 2 Full movement
- 1 Less than half of full movement
- 0 Less than 25% of full movement

Trunk rotation

- 2 Full range of motion
- 1 Less than half of full movement and poor coordination
- 0 Minor movement

Pick up a ball

- 2 Picking up the ball with minor difficulties on one or both sides
- 1 Picking up the ball with difficulty on one or both sides
- 0 Unable to pick up the ball from the floor

Upper extremities

Appearance

- 2 No deformity but coordination during movement less than normal
- 1 Minor deformity and incoordination during movement
- 0 Deformity in hand

Table 3 Lower extremity assessment

Movement pattern	Right	Left
1. Using lower limb during transferring/prowling wheelchair		
2. Standing		
3. Balancing		
4. Kneeling		
5. Walking (more than 10 m)		
6. Running		
7. Climbing stairs		
8. Kicking/thrusting with foot		
9. Control of foot (moving the foot from footrest to the ground and back to footrest)		
10. Abducting legs		
Sum		

Prowling wheelchair

- 2 Prowling wheelchair with good balance
- 1 Prowling wheelchair with difficulty
- 0 Dependent and unable to prowl wheelchair

Lateral transfer

- 2 Transferring independently
- 1 Required help for transferring
- 0 Unable to transfer

Touching behind the head

- 2 Full movement pattern
- 1 Around 50% of movement pattern
- 0 Less than 25% of movement

Shoulder abduction, elbow extension, and supination

- 2 Full movement pattern
- 1 Around 50% of movement pattern
- 0 Less than 25% of movement

Throwing a ball (overarm)

- 2 Skilled/coordinated function
- 1 Poor to fair throwing motion
- 0 Unable to throw overarm

Throwing a ball (underarm)

- 2 Skilled/coordinated function
- 1 Poor to fair throwing motion
- 0 Unable to throw underarm

Grasp and release

- 2 Skilled/coordinated function
- 1 Poor to fair function
- 0 Unable to carry out action

Open and close clothes peg, zip

- 2 Skilled/coordinated function
- 1 Poor to fair function
- 0 Unable to carry out action

Fasten and unfasten shoe lace

- 2 Skilled, coordinated and rapid function
- 1 Poor to fair function
- 0 Unable to carry out task

Lower extremities**Kneeling**

- 2 Maintain kneeling position for one minute
- 1 Maintain kneeling position for less than one minute
- 0 Unable to kneel

Use lower limb during transferring/prowling in wheelchair

- 2 Major support by lower limbs
- 0 Minor support by lower limbs
- 0 No effective function

Standing

- 2 Stand without any assisting device
- 1 Stand up with help or an assisting device
- 0.5 Some function in the lower limb, but insufficient for standing
- 0 Insufficient function for standing

Balancing

- 2 Can stand on one leg for 30 seconds
- 1 Can stand on one leg for less than 30 seconds or with inadequate balance
- 0 Unable to balance

Walking

- 2 Skilled/coordinated function (less than normal) during 10 m walking
- 1 Walking less than 10 m or using an assisting device
- 0.5 Walking with difficulty with or without assisting device
- 0 Wheelchair bound

Running

- 2 Skill/coordination during running is less than normal
- 1 Runs with a limp and incoordination of limb movements
- 0 Wheelchair bound

Climbing stairs

- 2 Climbing some stairs without any help or device
- 1 Climbing stairs with difficulty or with an assisting device
- 0 Wheelchair bound

Table 4 Key points for determining disabled sports classification (cerebral palsy ISRA)

Class	Points
8	115–130
7	100–114
6*	85–99
(More control problems in the upper limbs)	
5*	85–99
(More control problems in the lower limbs)	
4	70–84
3	55–69
(Rapid grasp and release, restriction of trunk rotation)	
2	40–59
(No hand function, poor grasp and release)	
1	under 40

*Class 6 athletes usually have more control problems in the upper limbs than class 5 athletes, although the former usually have better function in the lower limbs, particularly when running.⁶ For determining classes 5 and 6, the sum scores in lower limbs and upper limbs are compared; when the scores are equal or the sum scores in lower limbs are more than the sum scores in upper limbs, the sports class is 6; when the sum scores in upper limbs are more than sum scores in lower limbs, the sports class is 5.

Kicking/thrusting with foot

- 2 Ability to kick a ball
- 1 Kicks a ball without coordinated/skilled movement; if wheelchair bound, thrusts with feet
- 0 Insufficient movement to kick

Control of foot

- 2 Coordinated function less than normal
- 1 Incoordinated function/limb function restriction
- 0 No effective function

Leg abduction

- 2 Good coordination of the legs when a ball is passed through them
- 1 Poor to fair coordination of the legs when a ball is passed through them
- 0 No effective function

Wheelchair bound subjects score 0–1 depending on their quality of function

DETERMINING ATHLETICS CLASS

The scores obtained using the above scoring system must then be related to table 4 to determine the competition class.

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