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Medical classification in sport of disabled people

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Abstract:

Background: In the live of disabled people sport is very important not only in terms of health, but often becomes a passion that gives the life meaning. For many disabled athletes this passion becomes their profession. Medico-sport classification divides athletes into groups and classes based on the type of the physical and mental dysfunction in order to equalize the odds in a sports competition.

Material and methods: Analysis of available literature, articles in the Google Scholar and PubMed database using keywords: disabled, sport, classification, dysfunction.

Results: Medical-sport classification distinguishes groups of disability of: sight, hearing, limb dismemberment, paraplegia, diseases of the musculoskeletal system, cerebral palsy and intellectual disability. In the professional sport the athletes classification is done by medical doctors in cooperation with physiotherapists under the supervision of the Central Classification Committee of the “Start” organization, which verifies and approves the athletes membership to a certain group or class. During the athletes World Championships decision about the classification is done by the International Paralympic Committee (IPC), Cerebral Palsy International Sports and Recreations Association (CP – ISRA) and International Wheelchair and Amputee Sports Federation (IWAS). The group/class examination is carried out during the most important sports events like Paralympic Games, World Championships and European Athletics Championships, and remains valid for the next four years.

Conclusions: The aim of this classification is to make the athlete’s achievement in a sport competition be a result of the athlete’s physical and psychological training rather than the

level of his or hers disability. The subject of grouping and classification of the disabled athletes still remains an open topic for discussion.

Key words: disabled, sport, classification, dysfunction

Introduction

Sport is one of the most effective forms of improving people with disabilities, allows them to actively improve their abilities, becoming more independent. With the development of the sport of disabled people and related sports events, a medical and sports classification has to be created.

The medical-sport classification of participants with different disabilities was created in such a way as to equalize the chances of sports competition, by dividing them into groups and classes with a similar degree of disability. The disabled are an extremely diverse group, so their distribution is extremely demanding. According to general rules, when differentiating athletes with disabilities, the aim is to ensure that athletes' movement and intellectual abilities or the type of disease are not the result of athletes' success or outcome, but their preparation, experience or concentration and training. Classifications are conducted in such a way that it also gives the disabled people the chance to achieve triumphs in sports competitions [1, 2]. Originally, systematization was based on detailed elements of the medical examination and medical diagnosis. In time, functional analyzes were started - physical fitness was characterized on the basis of tests prepared for individual competitors. The result of these results is the occurrence of separate standardization in almost all disciplines. In each classification for groups and sports classes, the smallest possible disability that an athlete must have is also selected so that he can participate in competition for the disabled. Functional division for all disciplines is developed on the basis of an analytical balance, which includes the assessment of the level of amputation, ranges of joint movements, muscle strength, as well as based on the functional balance, based on the results of tests performed for a specific competition. Some disciplines, however, do not have functional classification, which means that everyone who has existing dysfunctions can participate in it (for example, wheelchair tennis). The problems of divisions cause many discussions and disputes [3, 4].

Classifications vary between disciplines, but there is a general medical classification that differentiates athletes into groups:

I - Disabled people with sight dysfunction
II - People with disabilities with hearing dysfunctions
III - Disabled people with limb amputations
IV - Disabled people with paraplegia
V - People with disabilities with various diseases of the musculoskeletal system - Les Autres
VI - Disabled people with cerebral palsy
VII - People with intellectual disabilities [5].

I. Disabled people with sight dysfunction "B" (blind)

Class B1

This class is made up of completely blind athletes as well as people who are able to determine the source of light, but they do not identify objects, even their outlines, regardless of distance or direction,

Class B2

This class includes visually impaired athletes whose visual acuity is 2/60 and / or a 5-degree visual field limitation. In contrast to the previous class, those qualified for this group have the functions of distinguishing objects or their outlines,

Class B3

This class includes visually impaired persons with visual acuity of more than 2/60, but less than 6/80 and/or limited vision in the range of 6 - 20 degrees [5, 6].

II. Disabled people with hearing impairment

Disabled people with hearing impairment and dysfunctions may compete on the same basis as non-disabled people. Modifications and facilities refer only to audible signals that have been replaced by visual signals - usually light. The classification of athletes with hearing loss is conducted by the International Committee of Sports for the Deaf, the minimum hearing loss of these people is at least 55 decibels [5,7].

III. Disabled people with amputations of upper and lower limbs "A" (Ambulatory)

The sports classification of people with amputations is used in the sport of disabled people to facilitate fair rivalries among people with various types of amputations. This division was established by the International Sport Organization for Persons with Disabilities (ISOD)

Symbolization for the classification system of amputee ISOD athletes is A1, A2, A3, A4, A5, A6, A7, A8 and A9. The first four symbols are intended for people with lower limb amputations. From A5 to A8 are intended for people with upper limb amputation. A9 is for people with combinations of upper and lower limb amputations. The typing system is largely medical and consists of four stages:

- medical examination
- observation on training
- observation during the competition.
- determination of the classification group.

Classification system:
A1 - bilateral amputation in the thigh,
A2 - unilateral amputation in the thigh,
A3 - bilateral amputation in the lower leg,
A4 - one-sided amputation within the lower leg,
A5 - bilateral amputation in the arm,
A6 - one-sided amputation in the arm,
A7 - bilateral amputation in the forearm,
A8 - unilateral amputation in the forearm,
A9 - amputation in the arm or forearm and one lower limb [2,8].

IV. People with disabilities with paraplegia "P"

This class includes:	
Disabled people with paralysis and paresthesia of the limbs accompanying the spinal cord injury, which is the result of the injury,	People with disabilities with paralysis and paresis of the limbs that have been caused by various spinal cord diseases, e.g. <ul style="list-style-type: none"> ● paralysis and paresis due to inflammatory changes in the spine - paraplegia spondylitica, ● paralysis and paresis as a result of neoplastic diseases of the spine and spinal cord - paraplegia neoplasmatologica, ● viral spondylitis - poliomyelitis anterior acuta (Heine's disease - Medina) [5,9]

Class 1 (A, B and C)

This group includes people with lesions at the cervical spine level, individual sub-categories distinguish the exact height of the injury and the functionality of the athlete.

Class 2

Total tetraplegia as a result of spinal cord injury in its thoracic section at Th1 - Th5 or equivalent disability. In this class, athletes are characterized by the inability to maintain stability in the strength, abdominal muscles are infested, the whole body is plumbed down.

Class 3

Total tetraplegia as a result of spinal cord injury in its thoracic section at Th6 - Th10 or equivalent disability. In this group, athletes are characterized by difficulties in maintaining stabilization in a sitting position, upper abdominal muscles with greater strength than its lower part, total plegria of lower limbs.

Class 4

Paraplegia due to spinal cord injury at Th11 - L3 or equivalent disability. Stabilization of the disabled person's body in a sufficient strength, muscularity of the abdomen and back are efficient, lack of antigravity, sci-fi, triceps and gluteal muscles. The sum of the muscle strength assessment of both lower limbs in the Lovett scale should be:

- 1-15 points following a spinal cord disorder
- 1 - 20 points following a spinal cord injury.

Class 5

Paraplegia due to spinal cord injury at elevation L4 - S1 or equivalent disability. . The sum of the muscle strength assessment of both lower limbs should be:

- 16 - 23 points following a spinal cord disorder,

- 21 - 40 points following spinal cord injury.

Class 6

Paraplegia due to spinal cord injury at S2 - S3 or equivalent disability. The sum of the muscle strength assessment of both lower limbs should be:

- 36 - 50 points following a spinal cord disorder,
- 41 - 60 points following spinal cord injury.

The modified Lovett test is used to assess muscular strength of the lower limb. The result is the sum of the points that were obtained for the following movements in the joints: hip joint (flexion, extension, abduction, adherence), knee joint (flexion, extension), ankle (bend extension).

Each movement is scored on a scale of 0 to 5 points. When assessing the upper limb the following movements are considered: shoulder joint (flexion, extension, abduction, adherence), elbow joint (flexion, extension), wrist joint (flexion, extension), metacarpopharyngeal joint (flexion, finger extension), metacarpophalangeal joint of the thumb (opposition movement, thumb extension).

Also in the upper limb, each movement is scored on a scale of 0 to 5 points. The number of points that can be obtained by examining muscle strength is: 80 points - for both lower limbs; 120 points - for both upper limbs, [2, 5, 10]

V. People with disabilities with various diseases of the Les Autres "LA"

The classification to Les Autres is based on the analysis of muscular weakness and range of motion. This classification is heterogeneous and very diverse in terms of somatic. The sports classification Les Autres is supported by the International Sport Organization for Handicapped (ISOD). The Les Autres disability class generally consists of two classes. They are people of short stature and people with disturbed passive range of motion. LAF1, LAF2 and LAF3 are classes for wheelchairs, while LAF4, LAF5 and LAF6 are outpatient classes [10].

Class LA1

This class includes athletes competing with significant quadrilateral damage, for example, muscular dystrophies, rheumatoid arthritis with existing contractures or multiple sclerosis (MS).

Class LA2

In LA2 class there are people with significant damage to three or two limbs, but with smaller dysfunctions than in LA1, for example, paralysis of one limb with the deformity of two others, some cases of hemiplegia.

Class LA3

Disability athletes in the above-mentioned class compete with the dysfunction of a minimum of two upper and / or lower limbs. Examples of such diseases are hemiparesis as well as stiffness of the hip and knee joint in one limb with deformation of one upper limb [2, 11].

Class LA4

This class includes athletes with limited functionality in both lower extremities, but with functional deficiencies smaller than in LA3, including stiffness and contractures in one lower limb with the limitation of the function of the other lower limb.

Class LA5

People competing in this class have a limited function of a minimum of one lower limb - stiffness or contractures of the hip or knee.

Class LA6

The last sub-group Les Autres qualifies disabled players with slight motor dysfunctions, for example plegia or damage to one upper limb, complete disability of the hand. This group is comprised of people with limb paralysis as a result of the following spinal diseases: MS, spinal cavity, spina bifida [5, 10].

People with low height.

Class SS1

Low growth. The height and length of a standing man with arms up are together equal to or less than 180 centimeters (71 inches). The height and length of the woman's arm jointly is equal to or smaller than 173 centimeters (68 inches)

Class SS2

The height and length of the standing man's arm are equal to or smaller than 200 centimeters (79 inches). The height of the woman with the length of the arm is equal to or less than 190 centimeters (75 inches) [4, 12].

VI. Invalids with cerebral palsy "CP"

The qualification system currently in force has been developed by the Cerebral Palsy International Sports and Recreation Association (CP - ISRA), a global institution that runs the sport of people with cerebral palsy. The distribution of these people is based on the extent and type of paralysis, muscle tonus, muscular strength, coordination, and type of movement. Muscle tone is assessed on the basis of a five-point Spasticity Grade Scale for Muscle Tone. Some sports disciplines have their own classification systems that apply to athletes with Cerebral Palsy. This class can be assigned to:

- disabled people with paralysis and spastic paresis of upper and lower limbs resulting from brain and cranial injuries,
- people with paralysis and spastic paresis as a result of diseases of the central nervous system, such as: children's cerebral palsy (MPD), strokes, hemofilism, athetosis, Parkinson's disease, chorea,

The division consists of 8 classes, they are marked with the abbreviation CP and assigned to the appropriate number. The first four apply to athletes whose means of transport is a wheelchair, while the next four are self-moving players [2, 10, 13].

Class CP1

Paralysis of four limbs, moving only with an electric wheelchair:

- significant problems in controlling the movement of upper limbs and torso,
- significant muscular tonus dysfunction in four limbs,
- spasticity or significant atetosis of four limbs,
- minimal muscular strength as well as deficiencies in coordination of upper limbs and torso.

Class CP2

Quadriplegia, locomotion only with the help of a pushchair, pushing back thanks to lower limbs:

- average degree of restrictions on the control of upper limb and torso movements,
- moderate muscle tone disorders in all limbs,
- the necessity of using a wheelchair while carrying out everyday activities [5].

CP3 class

Paralysis of three or four limbs or hemiparesis significantly increased, locomotion with a trolley thanks to the work of one of the upper limbs:

- moderate problems in the control of one of the upper limbs and torso,
- medium muscle tone dysfunctions of three limbs (two lower limbs and one upper limb),
- the opportunity to move the trolley thanks to one or two upper limbs, albeit at low speed,
- the necessity of using a wheelchair while performing daily activities.

Class CP4 (paraplegia)

- spastic paralysis of the lower limbs,
- high functional strength of upper limbs,
- the ability to cover minor distances with orthopedic equipment, the necessity of using a wheelchair in everyday tasks.

Class CP5

- spasticity of the lower limbs, which causes problems when walking,
- a slight paresis of the upper limbs, sufficient functional strength of the upper limbs,
- a possibility of walking with or without orthopedic equipment [2,5].

Class CP6 (quadriplegia, walking person)

- spasticity in all limbs, however, with the possibility of independent movement
- moderate muscle tone disorders in all limbs,
- moderate difficulty in controlling the movements of four limbs and torso,
- the ability to walk, and in some cases run without the help of third parties or supplies.

Class CP7 (hemiplegia)

Paralysis of all limbs or hemiplegia, medium or poorly marked, autonomy of movement:

- spasticity of one lower and upper limb on the same side,
- significant functional strength of the upper and lower limb on the other side,
- possibility of movement, limping due to spastic paresis, during the run visible asymmetry.

Class CP8 ("sub-normaux" minima involent)

Very slight form of disability, a person walking independently:

- slight spasticity of one or two lower limbs,
- significant functional strength in the upper limbs, poorly marked deficiencies in the coordination of the extremities,
- slight deficiencies in the efficiency of the lower limbs, jumpiness and running without significant dysfunctions [5, 10, 14].

VII. Intellectual disability

The International Sports Federation for People with Intellectual Disability (INAS) is the body that manages high-performance sport for people with intellectual disabilities. Tests have shown that people with intellectual disabilities often have less strength, endurance, agility, flexibility, balance and slower speeds than healthy people. They also reduce the peak heart rate and the lower peak of oxygen uptake. Many people with intellectual disabilities also have hearing or sight impairments.

Intellectual disability causes problems with sport performance due to problems with reaction time and processing speed, attention and concentration, working memory, executive function, reasoning and visual-spatial perception. These things are important components of sport intelligence [10, 13, 15].

Rules for the classification of people in sport of disabled people

To make sports struggles more interesting, the rule in sports competitions "the participation of the maximum number of competitors in direct competition" will apply. Therefore, they combine in the same group of disabled people with various medical conditions, but with comparable physical capabilities, based on the so-called functional classification.

In Poland, the team of specialist doctors and rehabilitation specialists, including physiotherapists, are involved in the qualification of invalids for sports. The final decision is managed by the Central Classification Commission of the "Start" organization. In the case of international championships and competitions, this provision belongs to the committees of the International Paralympic Committee (IPC), the Cerebral Palsy International Sports and Recreations Association (CP - ISRA), and the International Wheelchair Sports Federation (International Wheelchair and Amputee Sports Federation) - IWAS).

Eligibility tests are carried out at major events (Paralympic Games, World and European Championships) and are valid for four years. Athletes have sports and medical books in which there is an assignment to the group and sports class, description of the disease and the lack of contraindications to practice active sport. Sports organizations ensure that athletes have constant medical care to perform basic control and performance tests [2, 5, 10, 16].

Discussion

The value of sport in a life of persons with physical disabilities has been changing over the years. Initially, sport played a role mainly in functional improvement of persons with musculoskeletal disorders. Then, a competitive sport for persons with disabilities has developed, including the Paralympic. Competitive sport, by formal (sports associations, event calendar, game rules, etc.), is now the most fully formed form of physical activity performed by disabled peoples [13].

There are 20 Summer Paralympic sports, and four Winter together governed by the IPC (International Paralympic Committee) [17]. Competition is a defining feature of sport and one of several factors that differentiate sport from other physical activities such as exercise, activities of daily living or recreation [18]. Moreover, competition is known to be a potent social factor that motivates many thousands of people to play sport [19, 20]. However, when competition is one-sided or predictable, motivation to participate in sport is reduced, particularly among the unsuccessful. Classification in sport reduces the likelihood of one-sided competition and in this way promotes participation.

Paralympic sports require Selective Classification systems, so that athletes who enhance their competitive performance through effective training will not be moved to a class with athletes who have less activity limitation, as they would in a performance classification system. Classification has a significant impact on which athletes are successful in Paralympic sport, but unfortunately issues relating to the weighting and aggregation of measures used in classification pose significant threats to the validity of current systems of classification [18].

Conceptually, in order to minimise the impact of impairment on the outcome of competition, each classification system should:

- Describe eligibility criteria in terms of:
 - o type of impairment;
 - and o severity of impairment;

- Describe methods for classifying eligible impairments according to the extent of activity limitation they cause [17].

To classify impairments according to the extent of activity limitation they cause requires research which develops objective, reliable measures of both impairment and activity limitation and investigates the relative strength of association between these constructs in a large, racially representative sample. The paper outlines a number of objective principles which should be considered when deciding how many classes a given sport should have: the number of classes in a sport should not be driven by the number of athletes in a sport at a single time-point [17].

Competition in Paralympic sport is based on systems of classification. Development of such systems is difficult because consensus regarding what constitutes evidence-based classification do not exist and because, to date, classification in Paralympic sport has been largely atheoretical. But such a medical classification for sport of disabled people is extremely important for getting equitable and repetitive Paralympic sports results. The knowledge about this classification is significantly necessary for physicians and physiotherapists whose job is to help and develop athletes with disabilities.

Summary

Knowledge of sports and medical classification should be important both for the disabled and for all people cooperating with them, especially for physiotherapists who, thanks to it will be able to show in a professional and individual way the best possibilities from practicing sports .

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