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DOCUMENTARY STUDY OF THERAPEUTIC DEVICES FOR ASSISTING SUBJECTS WITH LOCOMOTOR PROBLEMS

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Abstract: *The paper presents the disabilities of the locomotors system, the procedures and devices used to rehabilitate the functions of the affected parts. Presentation of those devices that are used by combatants affected by theaters of operations and who or rehabilitated have trained and participated in the paralympics' games "Invictus".*

Keywords: *therapeutic devices, locomotors problems, paralympics' games*

1. INTRODUCTION

The Olympics took place every four years, on the feasts of Zeus, in the northwest of the Peloponnese, in the Olympia plain, where only men of Greek origin were allowed to participate, while women were not allowed to be present as spectators. Also, only the free citizens were admitted, the slaves being excluded. At the initiative of Pierre de Coubertin, the games of the modern Olympic Games took place in Athens, Greece in 1896. This is the pioneer of sports games that over time have divided into several branches: Olympic Games and Paralympics' Games, and these in turn have a few sub-categories. The Paralympics' Games were designed for disabled / handicapped athletes.[1]
The emergence of paralympics' games for wheelchair athletes had genesis in 1948, taking place in parallel with the UK Olympic Games after this edition were organized on a regular basis and since 1992 they are held after 3 weeks of the Games Summer Olympics having the same location as these. The Paralympics' Summer Games include the following sports: bowling, athletics, cycling, horseback riding, football, judo, weightlifting, canoeing, shooting, table tennis, volleyball, specific basketball, fenugreek, rugby, tennis. Sweden organized the first edition of the Paralympics' Winter Games in 1976, reaching the AIX edition where 600 athletes took part in the tests: alpine skiing, cross-country skiing, biathlon, hockey and curling.
In the Paralympics' Games there are separate Olympic games for athletes with hearing impairment and the Special Olympics for athletes with cognitive disabilities. Cognitive handicaps do not duplicate modal records but simply socialize.[2]

Figure 1: Paralympics' skiing

2. GENERAL CONSIDERATIONS ON PARALIMPIC COMPETITION

The father of this event is Prince Henry of Wales of Great Britain who has been thinking of creating a competition for army personnel starting with ill, wounded, veterans of war and aiming to create an international multi-sport event. The name Invictus is drawn from Latin and means "invincible" or "unbeaten". The Prince was inspired by the Warrior competitions in the United States, and he wanted to dedicate a competition to the wounded people in the war theaters [3].

2.1. Description of the competition

The opening ceremony in 2014 was attended by Prince Henry of Wales of Great Britain, then Prime Minister David Cameron, Prince Charles, Camilla, Duchess of Cornwall, Prince William and Frederik, Prince of Denmark. The event also included a first-time message - First Lady of the United States, Michelle Obama. The first Invictus games took place in March 2014 at Olympic Park Queen Elizabeth in London, UK. **Motto INVICTUS: "I am"** [4].

2.2. Disciplines INVICTUS

Due to the deficiencies of the invictus are limited in terms of movements, starting from classic sports, they have adapted for people with disabilities. The number of competitor samples is restricted and only the functional segments in the human body are worthwhile. The sport samples are adapted for paralympics' people: archery, motorcycle, paralympics' swimming, paralympics' athletics, indoor climbing, high weights, cycling / parachuting, seating volleyball, wheelchair basketball, rugby in the wheelchair, indoor kayak [4].

2.3. Participating countries INVICTUS

The countries that could participate in this competition had to hold troops in the theaters of operations, including Romania, which was actively involved in the Iraqi area where they had unpleasant incidents with soldiers wounded and dead.
Countries that have responded to Prince Harry's call are: Afghanistan, Australia, Canada, Denmark, Estonia, France, Germany, Georgia, Iran, Iraq, Jordan, the Netherlands, New Zealand, Romania, Ukraine, United Kingdom and the United States.[5]

3. DISABILITY OF SPORTS INVICTUS

The main deficiencies of wounded soldiers in war theaters are paralysis of the lower limbs due to the most displacements / cracks / rupture of the spine.

The vast majority of wounded soldiers in war theaters were trapped in ambushes with explosive craftsmanship made by their opponents, the explosive breath being very large and in the end causing major damage to soldiers even death.

Paralysis: is a partial motor deficit at the level of a member, or all four members.
Paralysis / paresis depending on localization and locomotors deficit, there are several types of paralysis:

- **Monoparticle** - is characterized by muscle weakness that affects all the muscles of a member.
- **Hemiparesis** - unilateral motor deficit of a body and comprising the lower limb and the upper part of the same part.
- **Paraparesis** is characterized by paralysis of the lower limbs. It most commonly occurs as a result of a spinal cord injury.
- **Tetraparesis** - is characterized by the paralysis of all four members. Peripheral nerve damage may occur.
- **Diplegies -** signifies the occurrence of an accentuated motor deficit, both at the lower and higher level.
- **Trilogies** - a transient form of paralysis that affects all three members, most frequently three.
- **Isolated paralysis -** of a group of muscles or a muscle.
- **Muscle paralysis -** which does not involve deficits in motor neurons. [5]

3.1. Disabilities of the locomotors system

Foot paw prosthesis: The high curvature of the curved main arc provides excellent shock absorption that is desirable for field sports such as tennis or basketball and the return to energy for activities such as sprinter and long-distance running. The basic spring and adjustable heel damping allow stability and control during fast movements while walking and standing (Figure 2) [6].

Figure 2: Foot paw prosthesis

Leg prosthesis: Ottobock's fitness prostheses make it possible to lift and move again (Figure 3). Ottobock fiber reinforced carbon fiber with the 3S80 knee can help you increase strength and mobility while improving health and well-being. And if you're an athlete in training, this is the protease you need [7].

Figure 3: Leg prosthesis

Knee prosthesis: The ability to withstand the impact of rolling, the rotary knee hydraulics control flexion and extension for dynamic response at different tread speeds. The hydraulic knee rotary system can accommodate flexion and rapid extension; it will not slow the user down and will give you another foot kick for strong footsteps (Figure 4). The compact and light design of the 3S80 makes it ideal for both weekend jogging and competitive sprints. And patients appreciate manual locking for security during heating, stretching, or other activities [8].

Femoral Prosthesis: From versatile version 3R80 shown above to the 3WR95 and Aqualine system presented here, there are several options for both knee and knee amputations and knee and knee (Figure 5) [9].

Full leg prosthesis: The 3D Helix Prosthetic Hip uses innovative technology to give you a more natural ride. With three-dimensional pelvic rotation, Helix mimics the natural movement of the human body, unlike other "articulated" prosthetic hips. The unique Helix design helps you get started easier, improves grip, and facilitates foot extension during walking (Figure 6). The results are dramatic [10].

Figure 4: Knee prosthesis

Figure 5: Femoral Prosthesis

Figure 6: Full leg prosthesis

3.2 Recovery

Help for heroes wounded in war theaters is done through sport using the recovery of wounded and sick. It offers a wide range of physical, psychological and social benefits, and is often the first step in developing confidence at the beginning of their long journey to recovery.

The recreational path is open to all service staff and wounded and sick veterans. This can be an introduction to sports. To participate in physical training activities at one of the Recovery Heroes Help Centers as a resident visitor or visitor. Also, a grant can be provided to allow a father who has lost his legs to move back with his child.

Recovery centers have developed relationships with community-based sports programs, military and civilian clubs and associations to offer a rich and varied offer that includes activities as diverse as ice-hockey and trolley driving [11].

4. COMPETITIONS RESULTS

Competitors at elite competitions are classified by disability to organize athletes with similar disabilities in the same event. A classified T11 athlete, for example, is an athlete with visual impairment.
F = Field athletes
T = Track athletes
11-13 - Visual failure. Compete with a view guide.
20 - Intellectual Disability
31-38 - Cerebral Palsy
41-46 - Amputation and Others 51-58 - Wheelchair
In wheelchair races, athletes compete in light racing chairs. Most marathoners have wheelchair divisions, and elite races have consistently defeated classical runners.
The best **example** is the double paralympics' champion, Liam Malone, says he will use the technology to run faster than the Olympic legend Usain Bolt (Jamaican Bolt sprinter, who will retire this summer as Olympic gold medal eight times set the world record of 100m, 9.58 seconds in 2009) over the next three years. The most symbolic prosthesis is the Flex-Foot Cheetah, used by 90% of the paralympic runners. Inspired by a cheetah's posterior feet, the carbon fiber blade works made [12].

Figure 7: Malone in running

5. PROSTHESIS DAMAGE HEALTH

The prostheses are artificial limbs used after amputation and injured people to allow them to walk, run, pedal, and hold objects.
They can take the form of almost body - including arms, legs and hands - and can be made of materials such as metal, carbon fiber or plastic.
While dentures date back thousands of years, their basic structure remains the same. An internal skeleton or column that provides structural support and is often made of carbon fiber. This can be covered with foam and latex to create a realistic look [14].
A suspension system attaches the human body to the body and can either be a wiring system or an airtight suction gasket. Between the pillar and the body is a socket that closes the residual limb, which must be perfectly smooth to prevent irritation or damage.
While modern dentures can be incredibly realistic, those used by athletes are designed for performance over aesthetics [13].

6. CONCLUSIONS

The paper presents the disabilities of the locomotor are system, the procedures and the devices used for the rehabilitation of the functions of the affected parts. It is presented the devices that are used by the affected combatants in the theaters of operation and who have rehabilitated and participated in the "INVICTUS" paralympics' games. Help for heroes wounded in war theaters is done through sport using the recovery of wounded and sick. It offers a wide range of physical, psychological and social benefits, and is often the first step in developing confidence at the beginning of their long journey to recovery. Help for heroes usually go through three distinct ways within the sport recovery program.
The agreement deals with employment, education and training. Performance in this segment has grown heavily since the beginning of 2008.
Over 350 events have been held over the last few years, and they have included over 50 different sports for approximately 2,500-3,000 people.
The inspirational effect of hosting the Paralympics' Games at home is also highlighted by Heroes Help, which has been providing, since 2012, about 1100 individual aids for sport, which represents an 80% increase over previous years to allow for participation higher to a number of physical development activities.

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