Review of generic aspects about Adapted Physical Activity in the Person with Spinal Cord Injury

Miguel Á. Capó-Juan[1, 2], Miguel Bennasar-Veny[2], Antonio Aguiló-Pons[2], Joan E. de Pedro-Gómez[2]

[1]Centro Base de Personas con Discapacidad. Dir. Gral. de Dependencia. Consejería de Serv. Sociales y Cooperación. Gobierno de las Islas Baleares.
[2]Facultad de Enfermería y Fisioterapia. Universidad de las Islas Baleares.

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Summary

Nowadays the Spinal Cord Injury (SCI) implies disability and dependency. The SCI causes changes in sensorial functions, motor functions and/or autonomic functions below the level of injury. The improvement of quality of life as well as the care, among other factors, have contributed to increase life expectancy. This fact allows the person with spinal cord injury to have a lengthy quality life. The person with spinal cord injury requires to follow a long-term program of Adapted Physical Activity (APA) to maintain his / her health. The benefits of APA and its modalities can enhance this activity. Likewise, political-social situation of each country can influence the design and the possibility of development of the APA. This article has been based on the following databases: SPORTDiscus, PubMed, Embase, Science Direct, PEDro and Cochrane Library, including review of the last ten years. 108 articles were found and 24 of them met all the criteria and they were included in this review. The selection criteria were the publication date during the mentioned period, articles with level of evidence A, B or C, and articles which highlight the APA in the person with spinal cord injury during the chronic phase. This research concludes with the following 1) We must continue promoting policies which support the inclusion of the APA. We must make them accessible to all people with disabilities and / or dependency, and in particular the person with spinal cord injury 2) The sport choices of the person with spinal cord injury depends on external factors and especially internal factors 3) The increase of the quality of life related to health and the improvement of self-esteem stand out as benefits of APA.

Key words:
Spinal cord injuries.
Sport for persons with disabilities.
Adapted physical activity.
Health promotion.

Revisión sobre aspectos genéricos acerca de la actividad física adaptada en la persona con lesión medular

Resumen

Actualmente la lesión medular ocasiona discapacidad y dependencia, y provoca alteraciones de las funciones sensitivas, motoras y/o autonómicas por debajo del nivel de lesión. La mejora de la calidad de vida junto a la de los cuidados entre otros factores, han contribuido al incremento de la expectativa de vida, permitiendo que un mayor número de personas con lesión medular (PLM) lleguen más cualitativamente a edades más longevas. La PLM requiere seguir un programa de Actividad Física Adaptada (AFA) para mantener su estado de salud. El conocimiento de los beneficios de la AFA y sus modalidades permite potenciar esta actividad. Asimismo, la situación política-social de cada país puede influir en la concepción y la posibilidad de desarrollo de la AFA. En este artículo se realizó una búsqueda en las bases de SPORTDiscus, PubMed, Embase, Science Direct, PEDro y Cochrane Library, incluyendo revisión de los últimos diez años. Se obtuvieron 108 artículos y 24 de ellos cumplieron todos los criterios, que fueron: la temporalidad señalada, artículos con grado de evidencia de A, B o C y los artículos que destacasen la AFA en la PLM como tratamiento en fase crónica. Tras la revisión se puede concluir que 1) Hay que seguir promoviendo políticas favorecedoras de la inclusión de la AFA con el fin de hacerlas accesibles a toda la población con discapacidad y/o dependencia, y en particular a la PLM 2) La elección de la práctica deportiva de la PLM dependerá de factores externos o ambientales y especialmente de internos o personales 3) Los beneficios que más se señalan sobre la AFA son: el aumento de la calidad de vida relacionada con la salud y la mejora de la autoestima e imagen corporal de la PLM respecto a la sociedad.

Palabras clave:
Lesiones de la médula espinal.
Deportes para personas con discapacidad.
Actividad física adaptada.
Promoción de la salud.

Correspondence: Miguel Ángel Capó-Juan
E-mail: miguelcapo@dgad.caib.es

Introduction

Spinal injury (SI) leads to disability and dependency[1], and provokes alterations to sensitive, motor and/or autonomic functions below the injury level[2]. The improvement in quality of life along with that of the care received, among other factors, have contributed to the increase of life expectancy, enabling a greater number of people with spinal injuries (PSI) to reach older ages[3,4].

Health-related quality of life (HRQL) is defined as that resulting from physician interventions[5]. These interventions enable individuals to understand the evaluation of their state of health from their own perspective[6], likewise, Adapted Physical Activity (APA) offers objectifiable health benefits for PSI.

The first uses of sports in PSI date back to 1944 in the Stoke Mandeville Hospital (United Kingdom), when Dr Ludwig Guttman[7] was already using sports as a rehabilitation method. Furthermore, Guttman founded the Paralympic Games with the aim of making handisport or APA not just a rehabilitation method, but also a way of achieving greater integration, inclusion and participation within society.

People with physical disabilities should carry out APA, in some cases requiring supervision. The PSI will require short-term physiotherapy treatment (strategies against algias, strategies against cardio-respiratory, digestive and urinary complications, and strategies for keeping tone) and long-term physiotherapy strategies, educational-therapeutic measures and APA modalities to improve mood, HRQL, self-esteem and well-being levels[8].

Some countries favour innovation, research and development policies in Paralympic sport, without a doubt, the world popularity of APA arose from the competition. Currently, the three most well-known sporting events are: the Paralympic Games, the World Special Olympics and the Deaflympics. PSI have been able to compete in the Paralympic Games since 1960, the year in which 23 countries participated in the event held in the city of Rome. In the recent Games in the city of Rio de Janeiro, 175 countries participated, with 4,350 athletes in 22 sports: athletics, wheelchair (WC) basketball, *boccia,* cycling, WC fencing, 5-aside football, 7-aside football, goal-ball, judo,weightlifting, horse riding, swimming, rowing, table tennis, WC tennis, archery, Olympic shooting, WC rugby, sitting sailing and volleyball, canoeing and triathlon[9]. This fact is a clear example of how the Paralympic Games manage to develop programmes that facilitate the integration process within our society[10].

As such, the main objective of this article is to review the APA that PSI may carry out, the factors that depend on this choice, and the consequences or effects of the APA and its link to the promotion of health and HRQL.

Development

A review was carried out of the SPORTDiscus, PubMed, Embase, Science Direct, PEDro and Cochrane Library databases of the articles published in the last ten years with the key words *"Spinal Cord Injuries, Sport for Persons with Disabilities, Adapted Physical Activity, Health promotion"*. From these potential articles found, a selection was made considering their appropriateness within the topic, excluding articles that did not meet the inclusion criteria. The inclusion criteria were: articles with a degree of evidence of A, B or C that included the development of any APA carried out by PSI. As exclusion criteria, the following were indicated: those articles that did not match the study topic and articles in which the PSI was in the acute/recent phase of the SI and therefore required other kinds of care. Of the 108 articles initially obtained from the search, 24 of them met all the criteria and were included in this review. Other relevant articles in the field were also considered.

Adapted physical activity: political-social situation

The term APA first appeared in 1973 with the foundation of the "International Federation for Adapted Physical Activity". APA, as defined by DePaw and Doll-Tepper[11] in 1989, is conceived as a sporting activity that pays attention to the capacities of people with limitations. APA is a wide conception that includes therapeutic, recreational and sporting activities without adaptation, with adaptation or newly created.

In the study by Martin *et al*[12], in which 695 PSI were interviewed over the telephone, daily practices poor in APA were revealed of 27.14 ± 49.36, with 50% of interviewees not performing any activity at all. This study, carried out in Sweden, indicated the need for specific interventions to stimulate physical activity in specific subgroups of PSI (women, older adults, more serious injuries, etc.).

Today, environmental barriers continue to pose a handicap across all levels, and are still very present in many countries. Serrano *et al*[13] indicated the difficulties in the practice of physical and recreational activity in Colombia, and the importance of generating political and social strategies to encourage the inclusion of people with physical disabilities. The study by Perrier *et al*[14], with a sample of 201 Canadians, highlighted the need for sporting organisations to adapt their programmes to promote sports among people with acquired physical disabilities. Currently, PSI report serious difficulties in accessing spaces where they can perform sport. Despite this, living close to a centre where APA can be carried out does not imply greater participation, as indicated by Arbour *et al*[15] in their study, in which this fact was analysed in 50 PSI. in in t.

Inclusion-favouring policies require a state implementation of an APA project for people with disabilities and dependency, which includes a specific action for each age range and need. Pereda and Calero[16] proposed an 11-phase methodology with this objective in Ecuador. Other simpler and less expensive alternatives could be effective, such as the one indicated by Arbour *et al*[15] regarding the effectiveness of an individualised telephonic programme with sporting guidance to promote APA in a sample of 65 PSI over six months.

In any case, some studies such as the one carried out by the North American Blawet and Lezzoni[18] indicated that public policies and governmental regulations are expanding and improving sporting opportunities among users with disabilities, promoting inclusion op-

portunities for participation in APA. Therefore, although adapted sport has made great progress, inclusion-favouring policies of APA should still be promoted in all countries with the aim of making it accessible to all the population that requires it.

Modalities of adapted physical activity

APA for athletes in WC is a healthy habit among PSI both physically and mentally[19]. Diverse entities develop sporting programmes with the aim of including APA as a fundamental part of daily life and promoting health. As such, the Spinal Cord Injury Foundation (FLM)[20] offers four different modalities within the Sporting Action Section: table tennis, quad-rugby, *boccia* and stacking. Along the same line, Handisport Mallorca[21] offers navigation activities, blokart, water skiing, kayaking, golf, trailing, diving and superfour 4x4. The Aspaym association[22], with headquarters across the whole of Spain, along with other organisations (foundations, sports clubs, non-profit making entities, etc.) participate and facilitate these APA, offering facilities and guidance. The APA that PSI can carry out are, among others: basketball, football, golf, *boccia,* athletics, hand cycling, fencing, weightlifting, horse riding, swimming, rowing, rugby, tennis, table tennis, archery, sailing, volleyball, Olympic shooting, motor racing, badminton, skiing, underwater activities, slalom, paddle tennis, etc.

Any APA can be carried out recreationally and/or competitively and preferably in a group with the aim of boosting and promoting healthy behaviour within the community. The conditioning factors when it comes to PSI choosing a sporting activity will depend on: external factors (weather conditions, geographical living location, normal place of residence, accessibility, socio-political strategies, etc.) and internal factors (interests and personal tastes, level of injury and the capacities of PSI, socio-economic situation, etc.).

On the other hand, classification and categorisation are important to consider in some competitive sports. Current functional classification focuses enable a wider vision of the athlete's reality. The aim of classification is the equity leading to individual competency development, an objective that is achieved through four stages and is led by the classifier. Classification is not a simple activity, and proof of that is the difficulty in developing valid measures for deterioration[23]. In some studies such as that by Gil *et al*[24], the relevance of classification was indicated, in this case, in WC basketball players. As such, some of the sports that PSI can carry out and that on a competitive level include adaptations in their classification depending on injuries are mainly: track and field athletics, basketball, rugby, Nordic skiing and swimming.

On the other hand, Saebu and Sorensen[25] indicated that personal factors have more influence on the practice of APA than environmental factors, or factors linked to functioning and the disability. Malone *et al*[26], in their study of 152 people with physical disabilities, indicated weaknesses referring to physical effort through the Exercise Benefits and Barriers Scale (EBBS)[27], achieving high response percentages in the following items: "Exercise tires me out", "Exercise is hard work for me" and "Exercise fatigues me".

Recent pioneering studies in our country, with cell therapy, have achieved improvements in the sensitivity, spasticity and motor function in over fifty percent of patients[28]. Furthermore, technical advances enable the offer of more alternatives to adapted sport compared to twenty years ago[29], thanks to the improvement and creation of new devices. Recent implantations of exoskeletons that are used for rehabilitation could offer standing sporting activities. Recent studies with these exoskeletons or Advanced Reciprocating Gait Orthosis (ARGO) already work with the aim of improving, among other functions, kinematics, speed and gait length[30].

As such, internal factors, for various reasons, may entail a more determining weight in the choice of an APA, also conceiving a new paradigm that will enable the expansion of the current offer.

Effects of adapted physical activity

Despite activity being conceived as a clear benefit regarding immobility, it should not fall in the mythification of the benefit *"per se"*. A critical attitude should always be upheld when promoting the APA[31], always considering a suitable control and follow-up.

Jacobs[32] indicated significant improvement in the muscle capacity of the upper limbs through participation in a 12-week resistance training programme. Ochoa *et al*[33] remarked upon the importance of physical activity as a tool against osteoporosis in the PSI. Davis *et al*[34] indicated cardio-respiratory, metabolic and bio-mechanical advantages as a response to the leg exercise with functional electrical stimulation. Some of the advantages were: an improvement of the blood circulation to the leg, an increase in enzymatic and metabolic activity, an increase in the capacity of functional exercise, an alteration of the bone mineral density, and the improvement of strength and muscle resistance.

Martin *et al*[35] revealed benefits of the APA such as psychological and physical well-being (prevention of chronic illnesses and the promotion of the physical condition). Furthermore, the importance of using the APA to promote health was highlighted. In the study by Gernigon *et al*[36] some differences were indicated in the PSI that did not practise APA compared to those that did, notably the first being low physical and overall esteem. Moreover, Day and Wadey[37] indicated how participating in sports is a central element in the recovery from a trauma in patients with acquired disabilities, and this participation enables improvements in the bodily and philosophical understanding of life.

Perrier *et al*[38], with the aim of highlighting the importance of sport in promoting health, revealed the effectiveness of the Health Action Process Approach (HAPA) in 101 people with acquired physical disabilities. Along these same lines, Wilhite and Shank[39] in their study with 12 people with disabilities that performed APA, indicated the benefits of sport on a physical, emotional and social level.

Despite some interventions promoting health such as APA lacking specific descriptions as to whether they help to reduce or prevent secondary conditions of the disability, long-term maintenance programmes should be promoted, which include participation in a community[40]. For this reason, these activities should be encouraged and guided with the

aim of promoting autonomy to increase the level of health, well-being, quality of life and self-esteem of PSI.

Final considerations

With over 70 years gone by since the start of this change in the paradigm of rehabilitating to enable, we are still working on this objective to approach and improve APA for PSI. Educational-therapeutic measures are essential in any programme in which physiotherapists participate[41], as such PSI will be ergonomically assessed in the sporting practice. The collaboration of other professionals in the field of Adapted Physical Activity and Sport will also be essential throughout this work, based on cross-disciplinary models.

Ferrante[42] reflected on the concept of disability and how sporting practice could transform the vision of the person with the disability. APA in PSI should be conceived as just another activity, standardised within everyday life, and not as a far-off activity that is impossible to achieve, worthy of admiration and contemplation.

Some of the limitations found in the undertaking of this review have been:

- The majority of studies do not explicitly describe the APA that is being performed.
- Some studies include other disabilities aside from SI in the same study group.
- The policies and social interests of people with disabilities are different depending on the country where the study is being carried out.

After this review it can be concluded:

- There must be an on-going promotion of policies that favour the inclusion of APA with the aim of making them more accessible to the entire population with disabilities and/or dependency, in particular to PSI.
- The PSI's choice of sport will depend on external or environmental factors, and in particular internal or personal factors.
- The most indicated benefits of APA are: an increase in HRQL and the improvement of self-esteem and body image of PSI in terms of society.

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