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ORIGINAL

Feasibility of 2 field-based cardiorespiratory function tests on adults with Down syndrome

R.I. Martínez-Lemos*, **C. Ayán-Pérez**, **J.M. Cancela-Carral**

Facultad de Ciencias de la Educación y del Deporte, Universidad de Vigo, Pontevedra, Spain

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KEYWORDS
Down syndrome;
Field test;
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Abstract
Aim: To identify the feasibility of 2 cardiorespiratory function field-based tests on adults with Down syndrome.
Methods: Thirty-three adults with Down syndrome (mean age 27.21 ± 8.76 years; 60.6% men) carried out the Mini-Cooper Test (MC) and the 16 m shuttle run test (16-m PACER). During the performance of both tests, heart rate was monitored with the aim of measuring the degree of effort shown by the participants. The Pearson correlation coefficient was used to assess the level of concordance between both tests.
Results: Both the MC and the 16-m PACER were easy to administer, and understandable for all the participants. Significant differences were observed by sex. Men achieved greater distances than women in the MC (529.23 ± 127.45 vs. 690.00 ± 126.59 m), and reached more stages in the 16-m PACER (1.69 ± 1.07 vs. 3.15 ± 1.28). The analysis of the degree of effort showed that final heart rate obtained at the end of both tests were around 90% of the predicted maximum heart rate. A significant degree of correlation between the MC and the 16-m PACER was observed both in men ($r = 0.567$; sig = 0.043) and in women ($r = 0.797$; sig = 0.001).
Conclusion: The results of this study suggest that the MC and the 16-m PACER test can be safely performed by adults with Down syndrome in order to assess their cardiorespiratory function.

PALABRAS CLAVE
Síndrome de Down;
Prueba de campo;
Eficiencia cardiorrespiratoria

Aplicabilidad de 2 pruebas de campo de valoración de la eficiencia cardiorrespiratoria en personas adultas con síndrome de Down

Resumen
Objetivo: Determinar la aplicabilidad de 2 pruebas de campo de valoración de la eficiencia cardiorrespiratoria en personas adultas con síndrome de Down.

* Corresponding author.
E-mail address: ivanmartinez@uvigo.es (R.I. Martínez-Lemos).

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Métodos: Treinta y tres adultos con síndrome de Down (edad media 27,21 ± 8,76 años; 60,6% hombres), realizaron las pruebas Mini-Cooper Test (MC) y Carrera de 16 metros de ida y vuelta (16-m PACER). Se monitorizó la frecuencia cardiaca durante la ejecución de las mismas a fin de comprobar el grado de maximalidad demostrado por los participantes. El grado de correlación de ambas pruebas fue analizado mediante el coeficiente de correlación de Pearson.
Resultados: Tanto el MC como la prueba 16-m PACER demostraron ser de fácil aplicación y comprensión por parte de los participantes. Se observaron diferencias significativas en base al sexo a favor de los hombres tanto en los metros recorridos en el MC (529,23 ± 127,45 vs. 690 ± 126,59) como en el número de paliers alcanzados en el 16-m PACER (1,69 ± 1,07 vs. 3,15 ± 1,28). El análisis de la maximalidad realizado determinó una frecuencia cardiaca final en torno al 90% de la frecuencia cardiaca máxima estimada al finalizar ambas pruebas. El grado de correlación observado entre el MC y el 16-m PACER fue significativo tanto para los hombres ($r = 0,567$;sig = 0,043) como para las mujeres ($r = 0,797$;sig = 0,001).
Conclusiones: Los resultados de este estudio sugieren que las pruebas MC y 16-m PACER pueden ser aplicadas a personas adultas con síndrome de Down de manera segura, al objeto de valorar su eficiencia cardiorrespiratoria.

Introduction

Cardiorespiratory function (CRF) is considered a highly relevant health marker that should be properly evaluated from early ages.[1] This is especially true for the individuals with Down syndrome (DS), who generally have a high level of physical inactivity.[2] In addition, people with DS usually have cardiovascular and metabolic abnormalities and problems in regulating and controlling their autonomic nervous systems that affect CRF negatively[3] and, consequently, their health. That is why individuals with DS should have their CRF assessed with certain regularity and appropriately, using specific tests with previously demonstrated applicability for this population. Laboratory stress tests are considered the gold standard in this regard, as they make it possible to establish CRF under controlled conditions and in a valid, reliable way.[4] However, performing this type of tests is limited by the availability of physical resources that are generally expensive. It is also limited by the presence of specialised staff to administer such tests and monitor their correct performance, which should be individualised. That is why field tests are so commonly used to assess CRF, due to their simplicity and low administration cost and the fact that they permit simultaneous assessment of various individuals in a short time. Despite this, and against what could be expected, the field tests to assess CRF in people with DS are few and almost all of them have been developed only with young and generally foreign populations.[5,6] It consequently seems necessary to analyse the usefulness of field tests applied to the Spanish adult population with DS. This will make it possible to provide information about which of these tests are more recommendable for assessing CRF in adults with DS; in addition, such an analysis will present mean values as a guide to make it easier to identify the CRF level once carried out by a population similar to the reference population. In this situation, the objective of this study was to analyse the usefulness of 2 field-based CRF tests when they are administer to a group of adult Spaniards with DS.

Material and methods

Participants

The participants in this study were recruited through an invitation sent to 2s [sic] DS associations in the south of Galicia (Spain). The criteria for inclusion were as follows: (a) the presence of trisomy 21, (b) being an adult and (c) being capable of understanding and following simple instructions. All individuals that had any type of documented partial or total medical contraindication against performing intense physical activity were excluded from the study. The research ethics committee at the University of Vigo (Spain) approved this study. All the parents or legal guardians of the participants were informed as to the study objectives and methodology of the tests to be performed and then gave their written consent. They also provided information about the chronological age and sex of the participants.

Field tests

We selected 2 tests that were feasible to carry out in a covered sports installation having a uniform surface covering and comfortable temperatures and humidity.

Mini-Cooper Test

This test is an abbreviated version of the Cooper Test, which has been considered valid for assessing CRF in healthy populations.[7] It consists of covering the maximum possible distance running, walking, or alternating both running and