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Original article

Scales for Physical fitness tests in male university students of Higher Polytechnic School of Chimborazo

Baremos para las pruebas de aptitud física en universitarios varones de la Escuela Superior Politécnica de Chimborazo

Pontuações para o teste de qptidão física na Universidade Escuela Superior Politécnica de Chimborazo male

Jaime Patricio Chávez Hernández[1]* iD https://orcid.org/0000-0002-9862-0165

Iván Giovanny Bonifaz Arias[1] iD https://orcid.org/0000-0001-8358-0124

Hugo Santiago Trujillo Chávez[1] iD https://orcid.org/0000-0001-8716-6641

[1]Escuela Superior Politécnica de Chimborazo. Ecuador.

*Correspondence author: jaimepatricio33@hotmail.com

ABSTRACT

Physical fitness is related to organic capacity of a subject to efficiently perform a certain physical activity. In the modeling of physical education classes, it is essential to have tools that allow the effective control of different capacities, and based on this, design the application of the specific physical stimulus, and pedagogical decision-making in general. The objective is to determine performance scales in physical fitness for male university students of the Higher Polytechnic School of Chimborazo. This work is based on a descriptive-analytical research of a quantitative and qualitative order. It is used a simple random sampling, a representative sample of 581 male students from the Higher Multi technical school of Chimborazo (17-38 years old) is selected, applying six assessment tests in physical fitness to form scales based on the percentiles application (95, 85, 75, 50, 25, 15 & 5.). In terms of results average values were reached in speed test (V50m: $\square$7.75s), in the abdominal test (A30s: $\approx \square$23 repetitions), the arm push-up test (FB30s: $\approx\square$ 24 repetitions), the flexibility test (F: $\approx \square$ 2.5cm), the horizontal jump test (SH: $\approx\square$ 189cm) and the endurance test (R1000m:$\approx\square$4.9min), making up the scales with seven mainl items. The performance scales in physical fitness for male university students of the mentioned university were determined. It is recommended to build and socialize results for the female gender.

Keywords: Scales; Physical fitness tests; Male university student.

RESUMEN

La aptitud física se relaciona con la capacidad orgánica de un sujeto para realizar eficientemente una actividad física determinada. En la modelación de las clases de educación física es imprescindible contar con herramientas que permitan el control eficaz de diferentes capacidades, y en función de ello diseñar la aplicación del estímulo físico en específico, y la toma de decisiones pedagógicas en general. El objetivo de este trabajo es determinar baremos del rendimiento en aptitud física para estudiantes varones universitarios de la Escuela Superior Politécnica de Chimborazo. El siguiente estudio se basa en una Investigación descriptivo-analítica de orden cuantitativa y cualitativa. Se utiliza un muestreo aleatorio simple y se selecciona una muestra representativa de 581 estudiantes varones de la Escuela Superior Politécnica de Chimborazo (17-38 años), aplicándole seis pruebas de valoración en aptitud física para conformar baremos a partir de la aplicación de los percentiles 95, 85, 75, 50, 25, 15 y 5. En materia de resultados, se alcanzaron valores medios en la prueba de velocidad (V50m: □7.75s), en la prueba de abdominales (A30s: ≈ □ 23 repeticiones), la prueba de flexiones de brazos (FB30s:≈□ 24 repeticiones), la prueba de flexibilidad (F: ≈ □ 2.5cm), la prueba de salto horizontal (SH: ≈□189cm) y de resistencia (R1000m: ≈□ 4.9min), conformando los baremos con siete ítems fundamentales. Se determinaron los baremos del rendimiento en aptitud física para estudiantes varones universitarios de la universidad mencionada. Se recomienda construir y socializar resultados para el género femenino.

Palabras clave: Baremos; Pruebas de aptitud física; Universitarios varones.

RESUMO

A aptidão física está relacionada com a capacidade orgânica de um sujeito para realizar eficientemente uma determinada atividade física. Na modelação das aulas de educação física, é essencial dispor de ferramentas que permitam o controlo efetivo das diferentes capacidades, e em função disso, conceber a aplicação do estímulo físico especificamente, e a tomada de decisões pedagógicas em geral. O objectivo deste trabalho é determinar escalas de desempenho em aptidão física para estudantes universitários masculinos na Escuela Superior Politécnica de Chimborazo . O estudo seguinte baseia-se numa pesquisa descritiva-analítica de ordem quantitativa e qualitativa. Foi utilizada uma amostragem aleatória simples e foi selecionada uma amostra representativa de 581 estudantes masculinos da Escola Superior Politécnica de Chimborazo (17-38 anos), aplicando 6 testes de aptidão física para conformar escalas a partir da aplicação de percentis 95, 85, 75, 50, 25, 15 e 5. Em termos de resultados, foram alcançados valores médios no teste de velocidade (V50m: 7,75s), no teste abdominal (A30s:≈□ 23 repetições), no teste de flexão de braços (FB30s:≈ □ 24 repetições), no teste de flexibilidade (F: ≈ □ 2,5cm), no teste de salto horizontal (SH: ≈ □ 189cm) e no teste de resistência (R1000m: ≈ □ 4.9min), formando as escalas com 7 itens fundamentais. As escalas de desempenho físico foram determinadas para os estudantes universitários masculinos da universidade mencionada. Recomenda-se a construção e socialização de resultados para o género feminino.

Palavras-chave: Balanças; Testes de aptidão Física; Homens universitários.

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INTRODUCTION

The control of performance is one of the fundamental aspects in the process of sport training direction, the physical education and all process linked to the social sciences in general and to the pedagogy in particular (Viru & Viru, 2003; Calero-Morales, 2019; Platonov, 2001). One of the inherent aspects of pedagogical processes is the construction of educational tools and evaluation of student performance, (Akselrad, Andrade, Calvo, & Massone, 2009; Chan & Quezada, 2013) being valid for all teacher-educational levels, regardless of the age range of the subject.

One of the most widely used tools in the sciences of physical activity and sport are the scales of evaluation of physical performance, given that they serve as moulds by allowing the evaluator to attribute to the subjects qualifications based on prospective models according to various requirements required by a given profession and objective. Therefore, the scales of performance can determine how a given subject is with respect to the normal average population, quantified and qualifying their qualities.

A review of the literature shows different scales constructed to evaluate sports performance in a given population, taking into account the different components of the athlete's preparation in trained and untrained organizations, such as the technical-tactical, (Calero, Suárez , & Fernández , 2012; Calero, Suárez , & Fernández, 2016) tests of the morphofunctional and physical component, (Tipán & Morales, 2018; Granja & Frómeta, 2018; Romero, Bacallao, Ponce, Chávez , & Vaca, 2014; Altamirano, Trujillo, Tocto, & Romero, 2015; Rubio, Sevilla, & Romero, 2018; Egas & Romero, 2018; Barcia, Alvarado, & Frómeta, 2018; Cabeza, Llumiquinga, & Guayasamín, 2020; Puente & Romero, 2016) and the fitness tests themselves for specific populations such as those in Ecuador, as evidenced in Flores, Calero, Arancibia, & García (2014a, b) and in Flores Abad, Arancibia Cid, & Calero Morales, (2014).

However, the construction of scales has been more limited for the area of Physical Education, especially in the environment of Ecuadorian training, although there are notable examples in international settings that include students from the basic level, as evidenced in García, (2010).

For the specific case of physical education in the university environment, the research background shows normative values to characterize the score in the concentration of attention in physical education students in Santiago de Chile, (Maurerira, Bobadilla, Ramírez, & Fuentealba, 2019) among others, related to psycho-pedagogical aspects (Maureira, Bravo, Ramírez, & Fuentealba, 2019). On the other hand, the consultation in the different primary research sources does not evidence the construction of scales for university students of different careers in Ecuador, which in some universities without exception have to take the subject of physical education, having the need to meet some internationally required standards from the point of view of physical qualities, hence the need to build pedagogical tools to facilitate the teaching-educational process.

In this sense, it is essential to have specific and accurate standards; therefore, the purpose of the research is to determine standards of performance in physical fitness for male university students from the Superior Polytechnic School of Chimborazo (ESPOCH).

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MATERIAL AND METHODS

To carry out this study, a descriptive-analytical research of quantitative and qualitative order is developed. Using simple random sampling, a representative sample of 581 male students from the Superior Polytechnic School of Chimborazo (Maximum age range: 38 years; Minimum age range: 17 years) in the Republic of Ecuador was selected. These students belong to the Faculty of Sciences, Faculty of Business Administration (FADE in Spanish), Faculty of Informatics and Electronics (FIE in Spanish), Faculty of Mechanics, Faculty of Livestock Sciences, Faculty of Natural Resources and Faculty of Public Health.

In order to conform the physical fitness scales, the results of six tests of physical performance assessment were listed, applying the 95, 85, 75, 50, 25, 15 and 5 percentiles:

1. Speed test in 50m (V50m in Spanish): estimate the translation speed. Take the measurement of the 50 meters, keep the same speed throughout the test, two evaluators are needed, one at the starting point and one at the end point, Record Sheet. Initial position: one leg in front slightly bent, trunk slightly inclined forward. Development: from the initial position, at the signal of the evaluator, the evaluator will run in speed as fast as possible for 50 meters, it starts to take the time at the beginning of the test and stops when passing the end point marked.

2. Abs test in 30 seconds (A30s in Spanish): estimar el nivel de fuerza resistencia en los músculos abdominales. Mantener las piernas flexionadas. Mantener los brazos cruzados sobre el pecho, tomando los hombros, El ejercicio solamente será válido cuando la repetición sea correcta. Posición inicial: acostado boca arriba, con las piernas juntas y flexionadas con los pies en apoyo plantar. Los brazos cruzados en el pecho. El evaluado debe sujetarse de los pies para realizar el ejercicio. Desarrollo: desde la posición inicial, el evaluado se traslada a la posición de sentado hasta que los codos logren tocar las rodillas, inmediatamente se regresa a la posición inicial. Repetir el ejercicio durante 30 segundos, se cuenta todas las abdominales que el evaluado logra completar con técnica adecuada en el tiempo establecido.

3. Test of arms flexion in 30 seconds (FB30s in Spanish): estimate the level of endurance strength in arm muscles. Perform as many repetitions as possible in 30 seconds. Initial position: lying down face down with your eyes forward, your hands must be leaned on the ground at the height of your shoulders, separated by their width; for men, their legs must be in full extension, their feet together, and their support must be on the tip of their shoulders; for women, their knees must be in contact with the ground. Hips, back and head shall be in a straight line. With this position, we shall proceed to make a total extension of arms. Development: from the initial position, perform a flexor-extension of the arms, bringing the elbows outward and without stopping to return to the initial position. Repeat the exercise for 30 seconds, counting all the repetitions that the person evaluated can achieve in a complete way and with good posture in the established time

4. Test of flexibility (F): measure the level of flexibility of the lumbar area and posterior muscle chain. Avoid bending the legs, avoid double extension or bounce when executing the exercise. The evaluator verifies with his hands that the knees are fully extended. Initial position: barefoot, standing with legs fully extended. The feet should be glued to the edge of the drawer with the arms extended forward. Development: from the initial position, a trunk flexion is performed with the view towards the front, without bending the knee joint

trying to reach the farthest point of the tape measure, that is, to reach the greatest possible amplitude, maintaining the position for two seconds. The exercise is made three times, without a rebound effect, and the result that had a bigger reach in centimeters is written down.

5. Horizontal jump test (SH in Spanish): estimate the level of explosive force (power) of the lower limbs. Mark in the flat surface a point A, so that this is the point of beginning, verify that the feet of the evaluated one are in the line of takeoff, Verify that the feet of the evaluated one are supported in their totality. Initial position: standing, feet separated at the width of the hips and attached to the launch line. Arms extended up and in front, trunk slightly inclined forward. Development: from the initial position, a knee flexion is made, followed by an arm swing, and later an explosive forward jumping movement, trying to reach the greatest possible distance. The fall must be balanced and without the support of hands on the ground; the test is repeated three times, and the jump is taken with the greatest distance reached, taking as a reference the point of the feet.

6. Endurance test in 1000m (R1000m in Spanish): indirectly estimate the Maximum Aerobic Speed (MAS) and maximum oxygen consumption (Vo2max). Starting Position (High Start): One leg forward slightly bent at the starting point, trunk slightly tilted forward. Development: from the initial position, the participant will run away once the evaluator gives the signal, at a speed that supports in such a way that he will have to complete the 1000 meters in the shortest time possible. The test will end when the evaluator completes the distance marked, and the time in minutes that the evaluator spent running it is recorded.

7. The qualitative scores are demarcated by the number of percentiles applied (seven items), which will depend on the numerical value achieved by each test of physical performance assessment, for the case of V50m and 1000m tests are decreasing (the lower numerical value higher performance) and the rest in increasing (the higher value number higher performance).

The qualitative scores would be:

1. Deficient.
2. Insufficient.
3. Bad.
4. Regular
5. Good.
6. Very good.
7. Excellent.

The data were collected by specialists in physical activity and sports, trained for this purpose through a postgraduate course, selected from the 15 who obtained the highest score. The data collected by the specialists were validated in practice using the method adapted from Anguera (1988), validating the coincidences through an expert, which evidenced an effectiveness rate in the information records greater than 95 %.

Once the tests are applied, the results are processed and taken to statistical programs which values are shown below:

RESULTS AND DISCUSSION

Table 1. - Descriptive statistics

	N	Minimum	Maximum	Mean	Desv. Deviation	Variance
V50m	581	4,23	13,02	7,7513	,83753	,701
A30s	581	9	39	23,25	4,737	22,442
FB30s	581	5	47	24,14	7,023	49,326
F	581	-26	32	2,49	7,534	56,768
SH	581	2	260	189,07	27,555	759,289
R1000m	581	3,18	12,12	4,9019	1,20475	1,451
N valid (by list)	581					

Table 1 shows the basic descriptive statistics obtained from the data collected by the specialists, where in the speed test a minimum value of 4.23s was reached in the 50m arranged for the test, plus a maximum value of 13.02s, for a mean or average of ≈ □ 7.75s.

In the abdominal test in 30s the minimum value was nine repetitions, and the maximum value was 39 repetitions, for an average of ≈ □ 23 repetitions. In the case of the 30s arm bending test, the minimum value reached was five repetitions, and the maximum value was 47 repetitions, for an average of ≈□ 24 repetitions. In the case of the flexibility test, the minimum value reached was ≈ 26cm, and the maximum de ≈ 32cm, for an average of ≈ □ 2.5cm. In the case of the horizontal jump test, the minimum value reached was 2cm, and the maximum value was 260cm, for an average of ≈□ 189cm. For the case of the resistance test in 1000m the minimum value reached was 3.18min, the maximum value was 12.12min and the average was determined at ≈□ 4.9min (Table 2).

Table 2. - Scales obtained from the physical fitness tests

		V50m	A30s	FB30s	F	SH	R1000m
Statistics							
N	Valid	581	581	581	581	581	581
	Lost	0	0	0	0	0	0
Mean		7,7513	23,25	24,14	2,49	189,07	4,9019
Desv. Deviation		,83753	4,737	7,023	7,534	27,555	1,20475
Variance		,701	22,442	49,326	56,768	759,289	1,451
Minimum		4,23	9	5	-26	2	3,18
Maximum		13,02	39	47	32	260	12,12
Percentiles	5	6,6610	15,00	14,00	-10,00	139,00	3,4500
	15	7,0630	19,00	16,00	-5,00	160,00	4,0100
	25	7,2850	20,00	20,00	,00	175,00	4,1500
	50	7,6400	23,00	24,00	3,00	192,00	4,5000
	75	8,1000	26,00	29,00	7,00	208,00	5,3350
	85	8,4500	28,00	32,00	10,00	215,00	6,1870
	95	9,2960	32,00	35,00	14,00	230,00	7,3490

The scales obtained are shown as part of table 2. Each qualitative value (Excellent, Very Good, Good, Fair, Poor, Insufficient and Deficient) corresponds to a quantitative value obtained by applying each percentile.

As stated in the introductory section, it is essential to have specific and accurate scales, given the existence of notable variations in population behavior, and other aspects related to uncontrollable factors, such as climate, topography, and social, historical-cultural and economic characteristics, which could cause significant variations in the motor component, and of the different physical capacities, as proposed by Chatterjee, Sherwin, & Jain, (2013) with the role of life events and the modifications of the external environment, or by the own characteristics of gender, which could evidence remarkable differences in the physical component, which deserves the conformation of specific scales for each gender, (Berg & Hughes, 2019) as it is recommended to carry out in future investigations.

In a conclusive way, it is stated that the research fulfills the proposed objective, determining the scales of performance in physical fitness for male university students of the Superior Polytechnic School of Chimborazo (ESPOCH). It is recommended to socialize the results for the female gender, conforming equally the scales of performance in physical fitness for university students of the mentioned university.

Acknowledgements

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