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Evaluation of the Morph-functional Competences of New Students of the Pedagogy Undergraduate Program in Physical Education of Universidad de Tarapacá

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ABSTRACT With the boom in the field of sport, many people consider the study of this branch of science, but will those interested have the morphological competences that require the training and future practice of this profession? Objective is to evaluate the competences of the new students of the Pedagogy in Physical Education course at the University of Tarapacá. A quantitative, non-experimental, cross-sectional investigation was carried out with an intentional sample, carrying out an anthropometric film study and a race test to assess physical capacity. Evidencing that: Thirty-six percent of the students did not practice physical exercises, twenty-seven percent were overweight, and eight percent were obese, the maximum oxygen consumption was 48.48 ml/kg/min. It is necessary to develop methodological strategies aimed at improving the morph status of the student so that the student optimizes the performance in their training process and thereby contribute to the improvement of the quality of the future teacher.

INTRODUCTION

In recent years, there has been a tendency towards attitudes about the practice of physical activity, which compromises the health status of the subject. The same concerns have been reflected similarly in university students, even of programs that are oriented to a good state of health as in the undergraduate program of Physical Education (Tongprasert and Wattanapan 2007; Secchi and García 2012).

This problem has manifested itself in children, young people, and adults in all latitudes. Telford (2017) highlights that in the current system of public primary education in Australia, physical education practices do not favorably influence the decrease of risk factors in children, making them enter secondary schools with a greater predisposition of suffering chronic non-communicable diseases. But unfortunately the presence of these risk factors, led by overweight and obesity, do not limit their transition to secondary schools, but they are dragged to university students, including students of pedagogical careers in physical education.

Many causes are involved in the decision of choosing to study the undergraduate program to become a teacher of Physical Education. Reference dissimiles of basic interests were collected, among which stand out: that it is an easy program, it does not require high scores of the System of Measuring the Quality of Education (SINSE), love for sports and practicing a sport, among others. This has led to the fact that students are sometimes observed in our classrooms with little interest in the future performance of this profession and, likewise, little motivation about the improvement of physical abilities, which could affect the student professional development, and professional practice.

It is an evident fact that the teaching-learning process related to the area of Physical Education requires differentiated teaching approaches regarding other areas. Since the characteristics, requirements, and situations of teach-

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ing in the classroom and those of our scope of action are different, demanding from the professional of the Physical Education, high theoretical training and adequate preparation of their physical capacities, to assume with quality the demands of this branch of sciences (Villar and Domínguez 2015).

It is thought that students or professionals related to physical activity and health should serve as models in the regular practice of physical exercise, to obtain a good physical fitness. Also, these students must have a fundamental role in the education and promotion of physical activity of the people; as future professionals should recommend and prescribe physical exercise (Secchi and Garcia 2012).

Likewise, the role of the Physical Education teacher generating positive attitudes towards physical activity should be exemplary, since their behavior, physical state, actions, and decisions, will directly influence the assessment that the student gives to the subject (Hernández and Velázquez 2007). Therefore, requiring the training of teachers with an integral line and their preparation is fundamental to the development of physical-motor skills. This a necessary element to evaluate teachers of Physical Education of researchers' center in the future. This is a feature that has captivated the interest of the researchers of this study.

Objectives

General Objective

To evaluate the morpho-functional competences of new students of the undergraduate program to become a Teacher of Physical Education at Universidad de Tarapacá.

Specific Objectives

- Identify antecedents concerning the practice of physical activity or sport.
- To determine the state of the body composition, through studies of percentage of fat mass, active body mass index, muscle mass index, weight, height.
- Evaluate changes in physiological variables, such as the adaptive response in the performance of a stroke test (heart rate, percentage recovery, maximal oxygen consumption.

METHODOLOGY

A non-experimental, transverse, descriptive, quantitative study was applied to an intentional sample (new students of the Physical Education undergraduate program at the Universidad de Tarapacá at the beginning of the 2016 school year). The ages were between 19 and 24 belonging to both genders. Seventeen (17) females and 31 males underwent a study of body composition and a race test that allowed to evaluate their physical capacity (applying Tokmakidis formula).

The data were collected in SPSS21 software for better analysis and evaluation. Nominal and conceptual variables were considered, using descriptive statistical methods for each of the studied variables.

Methods Utilized

Evaluation of Body Composition

The evaluation of body composition was based on the protocol of the International Society for the Advancement of Cineanthropometry (ISAK 2001). The study was conducted by an anthropometrist with more than 10 years of experience with ISAK certification. Among the variables analyzed were: body weight, standing height, sitting height, diameters, perimeters and 6 skinfolds. The measurements were made on the right side of the body, in a suitable place with good lighting, temperature, and privacy, in the morning time, without previously having practiced any physical exercises.

Body Composition

For the calculation of the body composition, it was carried out through the analysis of the percentage of fat from the skin folds, applying the method of Yuhasz, appropriate for people who practice physical activity and sport. Therefore, the following formula was used for its calculation:

Yuhasz (1974): 6 SKINFOLDS % of body fat.

% fat = 0.1051 X Sum X + 2.585 (V)

% fat = 0.1548 x Sum X + 3.580 (M)

Sum X = Sum Triceps + Subscapular + Supraspinal + Abdominal pleats + Mid-thigh + Calf.

From the percentage of fat and the total weight is calculated the fat weight and the lean or fat-free weight.

PG or "FM" (Kg) = (total weight (Kg) X % fat)/100.

PM or "FFM" (Kg) = total weight (Kg) – fat weight (Kg)-

From the fat percentage and the total weight the fat weight is calculated (PG) and the lean or fat-free weight (PM):

PG o "FM" (Kg) = (total weight (Kg) X % fat)/100

PM "FFM" (K) P l (K) PM o "FFM" (Kg) = total weight (Kg) – fat weight (Kg)

Physical Evaluations

For the assessment of physical variables, a race test was performed at distances of 1000 m for females and 1500 m for males. This test was applied to estimate the maximum oxygen consumption (VO2max) through the Tokmakidis formula, created by Leger, Mercier, and Bouchard, using as a variable that is, the time to travel a certain distance. (Tokmakidis (s.f.) referred to by Pancorbo 2002; Gil 2014). The VO2 max measures the body's ability to transport oxygen from the ambient air to the muscles that are working with.

The maximum oxygen consumption being one of the most important determinants of performance, its evolution varies depending on whether it is analyzed in absolute values (l / min) or relative values (ml/kg/min). The metabolic equivalent (MET) is the minimum amount of oxygen required for the body's metabolic functions, equal to 3.5 milliliters/ kilograms/ minutes.

The race test using Tokmakidis formula consists of running on foot over different distances, then from regression equations to estimate the maximum oxygen consumption, according to the time spent in the test. The performer must travel the distance in the shortest possible interval. After the end of the test, the time spent by the evaluator will be recorded. According to the recorded time the speed is calculated in kilometers per hour (Km/h), and then this data is replaced in the equation according to the corresponding distance:

Tokmakidis Formula.

1000m MET: $1.2730 + 0.8325^{*}$ (V Km/h)

1500m MET: $2.4318 + 0.8343^{*}$ (V Km/h)

The result of the equation is MET.

The VO2max in milliliters / kilograms / minutes is obtained when multiplying the MET by 3.5 (1 MET corresponding to 3.5 ml/kg/min).

To determine the speed (V) the following formula is applied:

V = distance Kilometric (Km) / time hour (h)

Instruments and Material

Digital balance with Fitness analyzer. Omron HBF-514 C.

ADE portable measuring device. Germany MZ 10042: Measuring range from 60 to 200 cm.

Tape measure: ADE. Germany

Panicle adipose meter (Plicometer): Baseline Type Lange. Measuring range: 0 mm to 48 mm.

Anthropometer Harpender of Holtain (Game). Range from 50 mm to 570 mm.

Vernier caliper. Measuring range: 0 mm to 250 mm. Mitutoyo Brand.

Stopwatch.

Facilities

Athletics track or flat terrain precisely marked.

RESULTS

As evidenced in Table 1 the antecedents concerning the physical activity practices of the students of the Pedagogy program in Physical Education at Universidad de Tarapacá show that of a total of 48 students assessed, 17 do not perform physical activity, while 15 practice physical exercises 2 to 3 times per week, and 11 refer to perform this activity more than 4 times per week. Emphasizing the behavior by sex, it is evident that 8 female students manifest not performing physical activity, while in men 9 are included in this category.

Table 1: Weekly frequency of activity practice in first year students of the pedagogy career in physical education

Never (%)	*2-3 time per week (%)*	*4 or more week (%)*
35.4	31.2	33.4

The above is a reflection of how the sedentary lifestyle has influenced future physical education teachers. The researchers believe that they should give the opportunity for all interested to be in this profession, however, this means that academics must provide differentiat-

ed attention aimed at students who are interested in the interest of the practice of physical exercises and necessary competences for training process.

The results show the morphological status of students, using the estimation of the Body Mass Index (BMI), with 6 students classified as overweight and one as obese, while in the male, 7 were evaluated overweight and three as obese. Observing that the 48 students evaluated, 4 were classified as obese, and 13 were overweight (Table 2). The previously exposed is a reflection of the link between sedentary lifestyle and the appearance of overweight and obesity, to which are added other predisposing factors such as: poor nutrition, the influence of technological advances, bad weather planning among others.

Analyzing the variables of body composition, it was established that: the average weight of the students behaved in 62.07 kg, with a standard deviation of 2.29 ± kg, in the male sex this variable showed an average of 69.85Kg, with a standard deviation of 12.23 ± kg. The size amongst women was evidenced in 159.2 cm, while in the group of males an average of 169.58 cm was observed.

When assessing the percentage of fat, it was observed that women presented mean values of 26.86 percent and men of 13.15 percent. It is evidenced that the students presented a mean in the active body mass variable of 44.77 kg, being this one amongst men of 60.42 kg (Tables 3, 4). At this point, the increase of bone fat is shown, especially in women, which is a last for physical performance, influencing in the same way, the health status of our students by a predisposing factor of injuries and chronic non-communicable diseases.

It can be observed in Tables 5 and 6 the behavior of biological variables and their immediate modification as an adaptive response to physical activity. The main results show that

Table 2: Morphological classification of first year students of the pedagogy career in physical education, according to BMI

	Underweight	*%*	*Normopressus*	*%*	*Overweight*	*%*	*Obesity*	*%*
Female	1	5	9	53	6	35	1	5
Male	1	3	20	65	7	23	3	9
Total	2	4	29	61	13	27	4	8

Table 3: Descriptive statistics of the body composition (Female)

Variables	*N*	*Minimum*	*Maximum*	*Media*	*Standard deviation*	*Variance*
Age	17	17.0	25.0	20.3	2.2	5.2
Weight	17	47.5	94.7	62.0	11.2	126.9
Size (cm)	17	150.0	165.0	159.2	3.8	14.9
BMI	17	21.9	28.6	24.5	8.3	5.3
Sum of corrected folds	17	43.2	139.2	83.4	27.6	763.5
% fat	17	17.7	42.9	26.8	7.3	54.5
Fat weight Kg	17	8.4	40.7	17.2	8.0	64.2
Active Body Mass Kg	17	37.3	53.9	44.7	4.6	21.5
Index (AKS) kg/cm^3	17	.9	1.3	1.1	.1	.01

Table 4: Descriptive statistics of the body composition (Male)

Variables	*N*	*Minimum*	*Maximum*	*Media*	*Standard deviation*	*Variance*
Age	31	18.0	36.0	21.2	3.5	12.2
Weight	31	51.5	98.5	69.8	12.2	149.5
Size cm	31	158.0	188.0	169.5	6.9	48.7
BMI	31	21.3	30.1	24.1	10.2	10.5
Sum of corrected folds	31	41.4	185.7	98.0	35.9	1290.4
% fat	31	7.6	21.6	13.1	3.5	12.1
Fat weight Kg	31	4.4	21.3	9.4	4.0	15.9
Active Body Mass Kg	31	45.1	78.1	60.4	9.1	82.5
Index (AKS) kg/cm^3	31	.7	1.5	1.2	.1	.02

women had a mean heart rate at rest (HRR) of 80.24 beats per minute, this variable in males is 69.87 beats per minute. The mean time expressed in minutes for the distance race of 1000 m in the female sex was 4.35, this variable in the race of 1500m in men manifested in 6.0 minutes.

Table 5: Descriptive statistics race 1000 m. Tokmakidis formula (Female)

Variables	*N*	*Media*	*Standard deviation*	*Variance*
FCr	17	80.2	5.5	30.4
FC Final	17	182.5	13.3	178.8
Time min	17	4.3	40.6	1649.6
Time h	17	.07	40.6	1649.6
Speed Km/h	17	13.8	1.4	2.0
VO_2 max	17	44.6	4.5	20.4

Table 6: Descriptive statistics race 1500 m. Tokmakidis formula (Male)

Variables	*N*	*Media*	*Standard deviation*	*Variance*
FCr	31	69.8	8.2	68.2
FC Final	31	174.5	21.9	482.1
Time min	31	6.0	40.8	1668.1
Time h	31	.1	40.8	1668.1
Speed Km/h	31	15.0	1.5	2.3
VO_2 max	31	52.3	4.5	20.3

The average speed used by the ladies during the race was 13.8 km/h, while in men it was verified at 15 km/h, with a standard deviation of ± 1.42 km/h and 1.5 km/h respectively. The maximum oxygen consumption could be calculated by applying the corresponding formulas according to the distance. Obtaining in the females the value is 29.0 milliliters/kilograms/minutes, while in males this variable behaved at 48.9 milliliters/kilograms/minutes.

DISCUSSION

To evaluate the morpho-functional state of students of the Pedagogy program in Physical Education becomes very valid in today's times. These students are equally affected by the effect of technological advances, the dynamics of everyday life, the increase of fast-food products and globalization, among other factors that favor the incorporation of unhealthy lifestyles.

The present study shows how these antecedents are manifested in the first year students of the pedagogy degree in Physical Education of the Universidad de Tarapacá of which thirty-six percent reported not practicing physical exercises, despite knowing that the background in relation to the practice of physical activity can influence their performance during their formation as future academics of Physical Education.

The researchers of this paper consider it necessary to establish programs focused on the promotion of physical activity among adolescents, especially in those who intend to study careers related to health promotion, as the one made by Okely et al. (2017) in which they expose the results of a multi-component school intervention based on the promotion of physical activity among adolescents in order to achieve improvements in physical condition.

Physical inactivity is usually accompanied by changes in body composition, manifested by increased obesity and overweight. In the present investigation, it was possible to verify that twenty-seven percent of the new students of Pedagogy in Physical Education were overweight and eight percent obese. These results are superior to those evidenced in the research carried out by Caballero et al. (2015), who evaluated the body composition of 167 university students of Physical Culture, Sport and Recreation of Universidad Santo Tomás. Bucaramanga, Colombia. These researchers concluded that twenty-one percent of the students were overweight and 3.6 percent were obese, according to the body mass index.

It should be noted that the results thrown by the first year students of the Universidad de Tarapacá are not satisfactory. This leads to the need to carry out a differentiated and individualized work in these students if you want changes in the state of health and in the conception that they have of physical exercise.

Brewer et al. (2017) emphasized that physical and health teacher training programs should examine what society needs and consider a new model for a teacher that is based on inspiring young people to develop healthy behaviors that last a lifetime. This approach is shared by the researchers of the present paper.

The body mass index (BMI) is an indirect indicator of the level of obesity in researchers' students. This variable showed average higher than that indicated by physical education students, reported by Paixão et al. (2012) who evaluated lifestyle and nutritional status of university students enrolled in the health area courses in Recife, which showed an average BMI of 21.9 kilograms/meters^2.

In the study carried out by Vásquez et al. (2015), the body composition of students of

physical education of the Universidad de San Sebastián was evaluated in different places and cohort. The study showed that the average of the BMI in the various branches under study in the 2015 cohort (which was the last cohort evaluated), behaved in lower values than those shown in the present study. The students at Valdivia Headquarters were the exception; they exhibited a slightly higher BMI than in the present study with results of 25.0 kilograms/meters^2.

In the research conducted by Rodríguez in 2016, they studied the anthropometric characteristics of university students of physical education at the Universidad de Zulia. The study showed that the women had a BMI of 22.8 kilograms/meters^2, lower than those shown in researchers' study. However, the male students of Universidad de Tarapacá showed lower values than those exposed by Rodríguez, who exhibited a BMI of 25 kilograms/meters^2.

In the current investigation, it was possible to identify that the ladies displayed a body weight of 62.7 kilograms, behaving this higher than that evidenced in the study carried out by Brito et al. in the year 2015, which evaluated 114 students, 85 boys, and 29 women. In the referred study, the ladies had a body weight of 57.95±8.61 kilograms. On the other hand, male students (in the present study) showed a body weight of 67.8 kilograms, being lower than the weight evidenced in the research carried out by Brito et al. (2015), in which their students showed a mean body weight of 72.88±7.20 kilograms.

It is necessary to emphasize that overweight and obesity predispose to the appearance of overuse injuries that can hinder the dynamic development of the training process of students of Pedagogy in Physical Education. Studies such as the one carried out by Van Beijsterveldt et al. (2017) highlight the incidence of illnesses and injuries that may be present in these students.

The size of researchers' female students showed a mean similar to that shown in the study by Brito et al. (2015), which resulted in 158.09 ±7.51 centimeters. Similar behavior was evidenced amongst males, the students evaluated in the present study showed mean sizes of 169.5 centimeters, comparable to those found in the research of Brito et al. (2015), which resulted in 168.02 ± 6.67 centimeters.

The percentage of fat, evidenced in the females studied showed values of 26.86 percent of fat, higher than those demonstrated in the research carried out by Brito et al. (2015), the results being 16.22±22.3 percent. In males, it was possible to identify similarity in the results, which was 13.5±3.5 percent of researchers' students and 13.18±2.76 percent for the referred study. In the research carried out by Rodriguez in the year 2016, the females showed values of percentage of fat, applying a formulation proposed by Yuhaz of 22.4 percent, lower to the one exhibited by researchers' female subjects.

When comparing other studies concerning the development of aerobic capacities and mainly aerobic power, through the VO2 max, it was possible to verify that the female students of the Pedagogy program in Physical Education of Universidad de Tarapacá showed results of 44.66 milliliters/kilograms/minutes. While the male students presented higher numbers with an average of 52.3 milliliters/kilograms/minutes, indicating a mean of both sexes of 48.48 milliliters/kilograms/minutes.

In the research conducted by Secchi and García (2012), whose primary purpose was to compare the levels of activity and physical fitness in Physical Education (EEF), Medicine (EM) and Public Accountant (ECP) researchers came to the conclusion that the students of the program of Physical Education exhibited values of VO2 max relative of 47.1±8.8 milliliters/kilograms/minutes, being these higher to those shown by the students of the other evaluated programs. As it can be evidenced, the mean result of researchers' study, showed values similar to those presented by Secchi and García (2012).

On the other hand, in the study carried out by Secchi and García (2012), the average VO2 max for men was 38.4±4.9 milliliters/kilograms/minutes, behaving lower than the results found in the researchers' study. While the females studied by Secchi and García (2012), showed results of VO2 max in 35±4.4 milliliters/kilograms/minutes, these being equally inferior to those evidenced in researchers' study. Secchi and García (2012) emphasize that the evidence of average values of VO2 max below the reference levels for a healthy adult population may be related to the conditions and customs of modern life, which are exacerbated in areas urban, a criterion that is shared by the researchers of the present study.

In the study carried out by Vásquez et al. (2015), in different universities, it was possible to see that the physical condition of the students of Physical Education, of both sexes, of Universidad San Sebastián, showed in their total average values of VO2 max; providing very little difference to those evidenced in researchers' study. These behaved indistinctly in the dif-

ferent establishments: At the Headquarters of Concepcion, the average values for both sexes were 45.7 milliliters/kilograms/minutes, at Santiago Headquarters, showed a VO2 max of 48.0 milliliters/ kilograms/minutes, at the Valdivia Headquarters, students demonstrated a VO2 max of 41.3 milliliters/ kilograms/minutes, and at Puerto Montt Headquarters, they manifested with a VO2 max of 52.4 milliliters/kilograms/minutes. As shown, all results were very close to those found in the present study (Vásquez et al. 2015).

CONCLUSION

It was possible to conclude that first-year students of the Pedagogy in Physical Education at Universidad de Tarapacá, do not present a morpho-functional state by the requirements and conditions of the university‘s undergraduate program which has been manifested in physical activity practice habits as well as in body composition and maximal oxygen consumption assessments. With thirty-six percent of students not practicing physical exercises, twenty-seven percent being overweight, and eight percent being obese when analyzing the result of the maximum oxygen consumption, it was evidenced that this one was similar to those found in the literature, both national and international, but in turn, should be increased.

RECOMMENDATIONS

Individualized strategies must be carried out aimed at improving the morpho-functional state of the new students with the career of Physical Education Teacher so that they can have a better performance in their student life and their professional practice.

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