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Flexibility is inversely correlated with Body Mass Index in Overweight Recreational Runners

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Abstract

Background

Flexibility is a skill of great importance to prevent the occurrence of muscle damage, and it constantly needs to be improved so that its benefits extend throughout life. Individuals with a higher body mass index (BMI) have a lower level of flexibility than those with normal weight or underweight.

Objective:

To correlate the flexibility with BMI of eutrophic and overweight recreational runners

Methods

This is a cross-sectional study conducted with 35 Brazilian recreational runners (22 women and 13 men), aged 34.65 ± 9.47 years. The period of running training data was obtained from a specific questionnaire. The body mass and height were measured to calculate BMI. Flexibility was assessed by the sit and reach test using a Wells Bench.

Results

Most participants were recreational runners for less than one year (68.6%, n = 24) and had a BMI classified as overweight (57.1%, n=20). There was no difference in the classification and value of flexibility and the period of running training between eutrophic and overweight subjects ($p \geq 0.05$). Among overweight participants, an inversely correlation was found between BMI and flexibility ($p = 0.047$).

Conclusion

Overweight recreational runners need to reduce their BMI to improve their flexibility

Keywords: Aerobic Training • Physical Exercise • Anthropometric Assessment

Introduction

The regular practice of physical exercise plays an important role not only in improving performance but also in the maintenance of health and prevention of chronic diseases such as diabetes mellitus and hypertension [1].

The practice of recreational running has gained many followers, promoting a better quality of life, improving aesthetics, social integration and reducing the stress caused by modern life [2]. However, non-supervised exercise may increase the chance of injury [2], and developing flexibility can prevent it. Flexibility is described as the ability to perform any range of motion of muscle with the maximum extension, whose ability is an important component of physical fitness.

Flexibility training in recreational runners increases amplitude by improving the movement technique and performance [3]. Subjects who practice physical activity and maintain a good level of flexibility are less exposed to injury and reduce muscle tension as their movements improve over time [4].

One of the factors that influence low flexibility is the high Body Mass Index (BMI). Kwiecinski et al. (2018) analyzed Polish adolescents to assess the relationship between flexibility and BMI, and the results showed that obese individuals have a worse flexibility in relation to those with adequate BMI [5].

This work stands out since there are few studies in the literature that evaluate recreational runners, especially regarding the assessment of their flexibility, which is an important variable in this population. Thus, this study aimed to correlate the flexibility with BMI of eutrophic and overweight recreational runners.

Methods

Volunteers

This is a cross-sectional study with a sample size of 35 recreational runners (22 women and 13 men), aged 34.65 ± 9.47 years. The power and sample size calculation could not be obtained since participants were recruited by convenience sampling. Regarding the period of running training, 68.6% (n = 24) practiced for less than one year and 31.4% (n = 12) for more than one year. Most participants were overweight (57.1%, n=20) and 42.9% (n=15) were eutrophic, according to the BMI. Anthropometric and flexibility data are shown in (Table 1).

Inclusion and Exclusion Criteria

The inclusion criteria were age ≥ 18 years, being a five-kilometer recreational runner and keeping a training frequency at least 3 times per week. Individuals who practiced any additional physical exercise or had any chronic disease were excluded.

Study Design

The research was carried out with subjects from the city of Anápolis (Goiás, Brazil) and approved by the Research Ethics Committee of the

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Table 1. Anthropometric and flexibility data of the participants.

Variables	Years
Body mass (kg)	70.61 ± 13.98
Height (m)	1.66 ± 0.09
BMI (kg/m^2)	25.42 ± 22.85
Flexibility (cm)[§]	28.74 ± 6.69

BMI. Body Mass Index.

Table 2. Gender distribution of patients.

Person	Eutrophic (n=15)	Overweight (n=20)	P value[1]
Weak	5(33.3)	6(30.0)	0.497
Regular	3(20.0)	4(20.0)	
Medium	2(13.3)	5(25.0)	
Good	3(20.0)	5(25.0)	
Great	2(13.3)	0(0.0)	

Data are presented in n (%).
[1]Pearson's Chi-square.

Table 3. Comparison of flexibility and period of running training, according to the participants' BMI.

Variables	Eutrophic (n=15)	Overweight (n=20)	P value
Flexibility (cm)	29.83±7.60	27.92 ± 5.98	0.412[1]
Period of running training (months)	5.00±3.0	5.00 ± 4.0	0.479[2]

Data are presented as mean ± SD.
[1]Unpaired Student's t-test.
[2]Mann-Whitney Test.

Table 4. Correlation between flexibility, anthropometric variables, and period of running training, according to the participants' BMI.

	Body Mass	BMI	Period of running training
	Eutrophic (n=15)		
Flexibility	0.089[1]	-0.058[2]	0.351[2]
	Overweight (n=20)		
Flexibility	-0.293[1]	- 0.448[2*]	0.012[2]

BMI. body mass index.
[1]Pearson's correlation coefficient.
[2]Spearman's correlation coefficient.
*p < 0.05.

Federal University of Goiás (Certificate of Presentation for Ethical Appreciation nº 56907716.5.0000.5083). The participants signed the Term of Free and Informed Consent.

Data collection was previously scheduled with the subjects. From a specific questionnaire, age and period of running training data were obtained. Then, evaluation of anthropometry and flexibility was performed.

Evaluation protocols

Anthropometry

BMI was obtained by dividing body mass by height (kg/m2). The body mass was measured with a digital scale and the height with a portable stadiometer, according to procedures described by Lohmann (1988) [6].

Results

Most participants showed weak flexibility, regardless of BMI (Table 2). The mean flexibility of eutrophic and overweight individuals was 29.83 ± 7.60 and 27.92 ± 5.98 cm, respectively (Table 3). There was no difference in the classification and value of flexibility and the period of running training between eutrophic and overweight recreational runners (p ≥ 0.05) (Tables 2 and 3). Among overweight recreational runners, a negative correlation was found between BMI and flexibility (p = 0.047) (Table 4). (Table 2, 3 and 4)

Discussion

The main finding of this study was the inverse correlation of flexibility and BMI among overweight recreational runners. Fernandes, Lourenço and Simões (2014) found, in a sample of 107 recreational adult runners, that the main problems related to injuries were related to training, time of practice and flexibility (p =0.0002) [7].

Kwiecinski et al. (2018) analyzed Polish adolescents (1,239 male and 939 female) to assess the relationship between flexibility and BMI. The results showed that both obese men and women had worse levels of flexibility (r = 0.8 p<0.01) [5]. This result is in line with this study since flexibility presented inverse correlation with BMI levels.

Street running practitioners have low levels of flexibility, which is explained by the lack of training of this variable, low level of strength mainly of the lower limbs (CHRISTOPHER et al., 2019) [8]. A systematic review by Christopher et al. (2019) analyzed seven articles in order to verify injury rates and levels of strength and flexibility in street runners. The results showed that runners with low levels of flexibility and strength are more likely to have any joint or muscle injuries [8].

Although street runners kept practicing, they were not supervised during training, and there was no individualized prescription of activities to improve anthropometric assessments, given that high supervision is essential to obtain results in anthropometric variables [9].

The levels of flexibility associated with high BMI are explained by the accumulation of abdominal fat, low levels of muscle mass and muscle strength, lack of practice in exercising the specific skill, in addition to lower functional capacity and greater difficulty in carrying out daily activities.

Although BMI is an important parameter for anthropometric evaluation and the subjects assessed were not athletes, the non-evaluation of body fat percentage was a limitation of this study, besides the non-evaluation of food intake.

The data found in the present study reveal the influence of BMI on the flexibility of overweight recreational runners, suggesting an improvement of this anthropometric variable for a better performance and physical fitness.

Conclusion

The inverse correlation of flexibility and BMI between overweight recreational runners demonstrates the need to improve the anthropometric profile of the subjects evaluated to enhance flexibility and, consequently, the quality of life.

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