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Association between obesity, food composition, physical activity and physical fitness of adolescents residents in the matola city

Abstract

Introduction: The etiology of overweight and obesity in children and adolescents, as well as its relationship with physical activity, fitness and caloric intake underlie greater investigative interest.

Objectives: examine the associations between dietary composition, physical activity levels and physical fitness in children and adolescents with overweight and obesity in Matola city.

Methods: 106 subjects of both sexes aged 10 to 15 years old (61 girls and 45 boys) were selected for convenience. Anthropometric measurements consisted of weight, height and waist circumference, measured according to the procedures described by Lohman et al.[1] The body mass index resulted from the weight ratio by the square of height. The battery of motor test Fitnessgram[2] was used to assess physical fitness. The modified and adapted by Florindo et al.[3] for children and adolescents of the Baecke[4] questionnaire was administered to assess physical activity. The feed composition was determined from information obtained through the questionnaire on eating habits. To examine the association between the variables of interest was applied to the Chi-Square in SPSS 21.0 program, 95% confidence interval.

Results: There were obvious higher proportions of subjects classified as unfit in almost all tests of physical fitness, especially aerobic capacity, where the proportions, differ significantly (apt: 2 (1.9%); unfit: 104 (98.1%), $X^2 = 13.396$; $p<0.01$). The physical activity of vigorous intensity proved to be associated with all indicators of physical fitness. The food composition did not limit the results observed in physical fitness.

Conclusions: confirmed the negative influence of both overweight, as obesity on physical fitness; the association between physical fitness and physical activity seemed to be determined by the intensity of this; the feed composition was not consistently associated with any variable.

Keywords: obesity, physical fitness, physical activity and food consumption

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Introduction

Overweight and obesity have been considered threats in the industrialized world for years, but are now also a risk factor in developing countries, including Mozambique, whose indicators are the rapid emergence of manufacturing industries, the discovery of hydrocarbons, as well as the replacement in cities of spaces for the practice of physical exercise and leisure by cafeterias and other spaces for the consumption of high-calorie foods (fast food). While Bouchard[5] defines overweight as the excessive increase in body weight in relation to height and age, Resende et al.[6] and Araújo[7] conceptualize obesity as a nutritional disorder characterized by a more accentuated adiposity according to sex, height and age, representing a potential for the development of different health disorders. The same authors also state that obesity can occur at any time of life, including childhood. Among the causes of obesity, the World Health Organization,[8] advances changes in lifestyle, highlighting sedentary lifestyle, which has been increasingly prevalent among all age groups, causing different metabolic pathologies, which provide the increase in combinations of health risk factors. Indeed, and still in this perspective, several authors claim that changes in physical activity and eating habits constitute, among others, a phenomenon of high impact on the epidemiological panorama of the population (CABALLERO, 2005; UNFPA, 2007); Prista[9] Several studies focused on this theme have shown that the reduction in the levels of habitual physical activity favors the gradual development of several chronic degenerative pathologies, such as obesity, dyslipidemias, diabetes, cardiovascular diseases, arterial hypertension, among many others, at increasingly precocious ages Boreham[10] (SANTIAGO, 2003). On the other hand, the lack of interest in the practice of physical exercises, combined with an unhealthy diet, which in recent times is influenced by the nutritional transition, a nutritional scenario characterized, on the one hand, by the change in eating habits, fundamentally prioritizing foods synthesized and high in calories, as is the case of diets rich in animal fats, sugars and refined foods, relegating, on the other hand, the consumption of complex carbohydrates and fibers, along with the decline in energy expenditure, have been evidenced. , also, as determining factors for the accumulation of fat in adipose tissue (DREWNOWSKI, 2000); Monteiro[11]; (OPS, 2000).

This problem enjoys an unquestionable investigative relevance insofar as, once it is recognized that the lifestyle begins to be outlined in childhood, it is possible to affirm that children with a low level of motor activity, for example, can become sedentary adults. and, consequently, not having a good quality of life index, which would translate into problems associated with low levels of physical activity, not only in body composition, but also in physical fitness related to health, such as Guedes et al.,[12.] warn. In this context, studying the association between dietary composition, levels of habitual physical activity and health-related physical fitness in school-age children and adolescents is of particular importance in the context of primary intervention, as it makes it possible to provide an early subsidies to

the competent authorities in order to develop actions that can help to promote the well-being of children and adolescents, in addition to constituting a highly relevant mechanism, as it can decisively interfere with information, awareness, promotion and motivation for the practice of regular physical exercise, in a society where chronic degenerative diseases are increasing exponentially due to hypokinesia.[13,14,9] Based on the importance of the aspects presented above in the field of public health in general, as well as on the value that information regarding the relationship between overweight, obesity, physical activity, physical fitness and caloric intake has in health and well-being of children and adolescents in particular, the present study is driven by the central purpose of examining the association between dietary composition, levels of physical activity and physical fitness in overweight and obese children and adolescents.

Material and methods

Sample

The sample consisted of 106 children and adolescents of both sexes, selected from a school in the city of Matola, aged between 10 and 15 years, 61 girls and 45 boys, with a body mass index above the expected for their age. The sample was divided into two age groups, namely the 10-12-year-old group and the 13-15-year-old group in both sexes. The participation of each member of the sample was voluntary, preceded by the sending of letters of informed consent to the school board and to the parents and/or guardians, in order to consent, in writing, in favor of the participation of their students.

Variables

Anthropometry

Anthropometric measurements consisted of weight, height and waist circumference, measured according to the standardization described by Lohman et al.[1] The body mass index resulted from the ratio of weight to the square of height.

Health-related physical fitness

Health-related physical fitness was assessed using the Fitnessgram[15] battery of motor tests, measuring trunk extension (trunk lift), arm flexion (push up), abdominal strength (Curl up) and aerobic capacity (Shuttle 20m).

Nutritional classification

Nutritional status was classified based on body mass index as a function of age and sex, according to the WHO cut-off points (2007).

Habitual physical activity

For the assessment of physical activity, the modified and adapted version by Florindo et al[3] from the Baecke's[4] questionnaire for children and adolescents was used. This questionnaire comprises 16 questions divided into three components, namely occupational physical activities, leisure-time physical exercises and physical locomotion activities.

Food composition

Food composition was determined from the information obtained through the recall questionnaire on eating habits that includes the frequency of daily meals and the type of food consumed, using the last week as a reference. To determine the caloric intake of the food composition, the reference values of the Dietary Reference Intakes were adopted ILSI[16]. It should be noted that there was a limitation of the participants not revealing the truth of their intake for some reason, hence the need for more accurate training of the interviewers to avoid inducing responses.

Statistical procedures

Descriptive analysis of variables was performed using the Statistical Package for the Social Sciences (SPSS) program, version 21.0. The data were checked for the normality of their distribution, as well as the possible presence of points outside the curve (outliers). The assumption of normal distribution of values was verified using the Kolmogorov-Smirnov test. The association between the variables of interest was examined using the Chi-Square test. The significance level was set at 5%.

Results

Table 1 presents the results of the analysis of proportions of the criterial assessment of physical fitness related to health of the entire sample according to sex. As can be seen, with the exception of the trunk extension test in which the opposite is observed, in general, the results show, in both sexes, higher proportions of unfit subjects in most motor tests, suggesting a poor functional ability associated with the health of most subjects in the sample of the present study. On the other hand, the results of the association between overweight, obesity and health-related physical fitness as a function of sex reveal, in both sexes, higher rates of unfit individuals in most physical fitness variables (Table 2). The proportions found in the different motor tests differed significantly only in the aerobic capacity in females ($X2=13.396$; $p<0.004$), while in males no significant differences were found between the nutritional groups in any of the physical tests. The results regarding success or failure in physical fitness tests as a function of physical activity levels (Table 3), contrary to what was expected, show higher failure rates even among subjects who practice vigorous physical activity, with the exception of the Trunk Extension test. The results of the examination of the relationship between the success rates in physical fitness tests and food composition reveal a statistical similarity of the proportions found in the three food composition groups, indicating higher failure rates in the three groups in most physical fitness tests (Table 4). The results of the association between levels of physical activity and food composition (Table 5) attest to a predominance of balanced food composition for the three levels of intensity, with greater emphasis on physical activity of vigorous intensity, which is practiced by 53.8% of subjects with a balanced diet. These results do not reveal statistically significant differences ($X2=4.860$; $p<0.302$).

Table 1 Results of the analysis of the proportions of the criterial assessment of health-related physical fitness of the entire sample according to sex

Sex	trunk extension		Push up		Strength Abdominal		Aerobic Capacity	
	Apts	Unfit	Apts	Unfit	Apts	Unfit	Apts	Unfit
Female	59 (55.7)	2 (1.9)	6 (5.7)	55 (51.9)	12 (11.3)	49 (46.2)	-	61 (57.5)
Male	42 (39.6)	3 (2.8)	7 (6.6)	38 (35.8)	13 (12.3)	32 (30.2)	2 (1.9)	43 (40.6)
Total	101 (95.3)	5 (4.7)	13 (12.3)	93 (87.7)	25 (23.6)	81 (76.4)	2 (1.9)	104 (98.1)
X^2	0.661		0.787		1.221		2.763	
p	0.416		0.375		0.269		0.096	

Table 2 Results of the analysis of proportions of the criterial assessment of physical fitness related to the health of the sample according to sex and age

Ages groups	Nutritional groups	trunk extension		Push up		Abdominal strength		Aerobic capacity	
		Apts	Unfit	Apts	Unfit	Apts	Unfit	Apts	Unfit
FEMALE									
12-Oct	Overweight	13 (12.3)	1 (0.9)	4 (3.8)	10 (9.4)	3 (2.8)	11 (10.4)	2 (1.9)	12 (11.3)
	Obesity	47 (44.3)	-	3 (2.8)	44 (41.5)	11 (10.4)	36 (34.0)	-	47 (44.3)
13-15	Overweight	7 (6.6)	1 (0.9)	1 (0.9)	7 (6.6)	1 (0.9)	7 (6.6)	-	8 (7.5)
	Obesity	34 (32.1)	3 (2.8)	5 (4.7)	32 (30.2)	10 (9.4)	27 (25.5)	-	37 (34.9)
X^2		4.435		5.025		0.826		13.396	
p		0.209		0.17		0.843		0.004	
MALE									
12-Oct	Overweight	7 (6.6)	-	1 (0.9)	6 (5.7)	-	7 (6.6)	1 (0.9)	6 (5.7)
	Obesity	37 (34.9)	3 (2.8)	6 (5.7)	34 (32.1)	12 (11.3)	28 (26.4)	1 (0.9)	39 (36.8)
13-15	Overweight	16 (15.1)	-	1 (0.9)	15 (14.2)	4 (3.8)	12 (11.3)	-	16 (15.1)
	Obesity	41 (38.7)	2 (1.9)	5 (4.7)	38 (35.8)	9 (8.5)	34 (32.1)	-	43 (40.6)
X^2		1.828		0.859		3.269		7.029	
p		0.609		0.835		0.353		0.071	

Table 3 Results of the association between physical activity intensity and health-related physical fitness for the entire sample

Physical Activity Intensity	Trunk extension		Push up		Abdominal strength		Aerobic capacity	
	Apts	Unfit	Apts	Unfit	Apts	Unfit	Apts	Unfit
Light	3 (2.8)	-	-	3 (2.8)	-	3 (2.8)	-	3 (2.8)
Moderate	12 (11.3)	1 (0.9)	2 (1.9)	11 (10.4)	1 (0.9)	12 (11.3)	-	13 (12.3)
Vigorous	86 (81.1)	4 (3.8)	11 (10.4)	79 (74.5)	24 (22.6)	66 (62.3)	2 (1.9)	88 (83.0)
X^2	0.419		0.537		3.222		0.362	
p	0.811		0.764		0.2		0.834	

Table 4 Results of the association between food composition and health-related physical fitness for the entire sample

Feed Composition	Trunk extension		Push up		Abdominal strength		Aerobic capacity	
	Apts	Unfit	Apts	Unfit	Apts	Unfit	Apts	Unfit
Balanced	68 (64.2)	1 (0.9)	10 (9.4)	59 (55.7)	17 (16.0)	52 (49.1)	1 (0.9)	68 (64.2)
Hypercaloric	31 (29.2)	4 (3.8)	3 (2.8)	32 (30.2)	8 (7.5)	27 (25.5)	1 (0.9)	34 (32.1)
Hypocaloric	2 (1.9)	-	-	2 (1.9)	-	2 (1.9)	-	2 (1.9)
X^2	5.246		1.042		0.67		0.288	
p	0.073		0.594		0.715		0.866	

Table 5 Results of the association between levels of physical activity and dietary composition

Physical activity intensity	Feed composition		
	Balanced	Hypercaloric	Hypocaloric
Light	3 (2.8)	-	-
Moderate	9 (8.5)	3 (2.8)	1 (0.9)
Vigorous	57 (53.8)	32 (30.2)	1 (0.9)
X^2	4.86		
p	0.302		

Discussion

The central purpose of the present study was to examine the association between dietary composition, levels of habitual physical activity and health-related physical fitness in overweight and obese adolescents. With the exception of the trunk extension test, in which a success rate of 95% of the entire sample was recorded, in the remaining indicators of physical fitness, the results found clearly reflect high rates of subjects who do not comply with the criteria of the battery of tests used to be considered apt, with failure rates ranging between 76.4 and 98.1%. Indeed, the proportions found in the different tests show highly significant statistical differences only in the aerobic capacity in females (X2=13.396; p<0.004). These results are contradictory to those reported by Muria et al.[17] in their study carried out with Mozambican children and adolescents using the same battery of tests used in the present study, whose purpose was to test, in African populations, the criteria suggested by the Prudential Fitnessgram battery. To this end, these authors evaluated 547 children of both sexes, aged between 8 and 11 years, and found a high proportion of subjects that exceeded the cut-off values defined by the Fitnessgram to classify subjects as fit from the point of view of associated physical fitness. health, with values of 99.1% and 96.6% for boys and girls, respectively.

Regardless of the methodological differences that the two studies may present, especially regarding the sample size and the sampling techniques adopted, namely simple random sampling in the study by Muria et al.[17] and non-probabilistic convenience sampling in the present study, the high proportion of subjects with poor physical fitness found seems to be justified by the rapid socioeconomic transition that the country is going through, which is considered the main factor that exacerbates changes in eating habits in all segments

of society, reaching even the disadvantaged socioeconomic classes, providing the coexistence between obesity and malnutrition in this particular context Nhantumbo[18] On the other hand, studies focused on the analysis of changes in the pattern of physical activity as a result of urbanization and sociocultural determinants document an abrupt reduction in the levels of physical activity in Mozambique associated with a rampant urbanism that has been reflected in the increase in mechanization and in the reduction of free spaces for the practice of recreational activities Saranga et al.,[19]. These findings partially explain the results of the present study, considering that reduced levels of physical activity negatively influence the expression of health-related physical fitness, in addition to exacerbating obesity.

Indeed, the literature praises that children and adolescents tend to become obese when they assume a sedentary lifestyle or with little movement, adding that obesity itself, due to its psychophysiological effects, can make them even more sedentary Jebb et al.,[20] On the other hand, physical activity, even when practiced outdoors and spontaneously, is extremely important in body composition and obesity prevention Matsudo et al.[21]

It is curious and interesting to note that while in females the proportion of unfit subjects decreases with advancing age, the opposite is observed in males, albeit marginally. If the behavior of the proportions observed in females is justified by the increase in physical fitness levels as a function of age, a scenario already reported in Mozambican school-age children and young people,[22] now in males there seems to be a more marked deterioration of functionality with advancing age, at least in obese adolescents. On the other hand, it was not possible to verify a consistent association between the intensity of physical activity and physical fitness due to the absence of statistically significant differences between the proportions of fit subjects found in the different indicators of physical fitness as a function of the intensity of physical activity. Similar results were found by Pierine et al.,[23] when observing between overweight and obese individuals a clear statistical similarity in terms of levels of physical activity and physical fitness. However, the fact that the success rates achieved by subjects who practice vigorous physical activity exceed the other levels of intensity seems to send a sign of some positive influence of the intensity of habitual physical activity on health-related physical fitness in overweight and obese adolescents.

Food composition did not show any association with most indicators of physical fitness, despite the greater predominance of subjects reporting a balanced diet (65.1%) compared to hypercaloric (33.0%). Therefore, there was an excessively low proportion of subjects indicating a hypocaloric diet (1.9%). These results corroborate those available in the literature, which support that adolescents consume portions of fruits, legumes and whole grains below the recommended, and the foods most used for industrialized (starchy) products are above the recommended, that is, young people replace traditional foods (whole grains) for products with low nutritional value and high caloric content, such as industrialized products, which are dense with energy and, therefore, there is an inadequacy of food groups.[24] In any case, and considering that it is from school age onwards that young people gain autonomy in terms of food intake preferences, it seems to be of central importance and strategy in the field of health education that such preferences are stimulated in a healthy way in order to prevent childhood obesity. It should be noted, however, that 53.8% of the sample of the present study reported regular physical activity of vigorous intensity, combined with a balanced diet, which seems to suggest a healthy diet for the majority of this sample, although there is a need to promote physical activities and sports associated with greater caloric expenditure.[25–28]

Conclusion

Given the methodological and sampling limitations, and based on the results found, the following can be concluded: (i) the negative influence of both overweight and obesity on physical fitness was confirmed, translated by high proportions of failure in most of the motor tests; (ii) although not consistently, the association between physical fitness and physical activity seemed to be determined by its intensity and (iii) it was not possible to observe any association between dietary composition and levels of physical activity and physical fitness.

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Conflicts of interest

The author deflects there is no conflict of interest.

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