

Obesity and physical fitness among children (6-10 years) from Azores islands (Portugal)

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1. Introduction

The prevalence of obesity and of lower levels of physical fitness seems to be a major problem for the public health. The WHO designates obesity as one of the most important public health threats because of the significant impact of chronic conditions associated with obesity. Physical fitness could act as a protective factor of various diseases, e.g. cardiovascular diseases.

The purposes of this study are: to determine the prevalence of obesity among school children (6-10 years old) from Azores islands (Portugal) by means of body mass index (BMI), to identify the levels of health related physical fitness (HPF), and to investigate the difference between obese and non-obese in HPF.

3. Results

Percentage of children in each physical fitness zone, by gender and age

Age Zones	Trunk lift			Curl-up			Push-up			1-mile run/walk		
	0	1	2	0	1	2	0	1	2	0	1	2
Boys												
6	0.3	0.7	99.0	33.9	30.1	36.0	34.6	30.1	35.3	0.3	99.7	-
7	-	0.7	99.3	34.7	27.8	37.5	38.9	32.2	28.9	1.3	98.7	-
8	-	-	100	33.0	34.3	32.8	43.1	32.8	24.1	1.1	98.9	-
9	-	-	100	29.1	32.9	38.0	47.1	37.3	15.6	1.2	98.9	-
10	-	-	100	26.3	28.1	45.6	42.3	47.3	10.3	31.3	39.9	28.8
Total	n	%	n = 1913									
	1	5	1907	606	591	716	796	672	440	105	1726	81
	0.1	0.3	99.7	31.7	30.9	37.4	41.6	35.4	23.0	5.5	90.3	4.2
Girls												
6	0.4	-	99.6	31.6	29.7	38.7	53.7	24.6	21.6	2.2	97.8	-
7	0.5	-	99.5	33.5	26.0	40.5	55.0	30.6	14.4	1.4	98.6	-
8	-	0.2	99.8	31.1	36.3	32.6	60.0	29.2	10.7	1.9	98.1	-
9	-	-	100	32.5	32.9	34.6	67.6	25.4	7.0	2.4	97.6	-
10	0.4	-	99.6	33.2	29.5	37.3	69.3	21.6	9.1	37.3	52.3	10.4
Total	n	%	n = 1829									
	4	1	1824	591	569	666	1116	492	220	121	1682	25
	0.2	0.1	99.7	32.4	31.2	36.5	61.1	26.9	12.0	6.6	92.0	1.4

Percentage of success (zone 0 and 2) in four HPF test items by gender and age

Age	Girls		Boys	
	%	Confidence interval (95%)	%	Confidence interval (95%)
6	40	34-46	49	43-55
7	37	32-42	45	40-50
8	32	28-37	45	40-50
9	27	23-31	40	35-45
10	18	13-22	39	33-45

The ratios of success in tests of HPF both in boys and girls were low. In girls there was a substantial decrease of ratio of success between 6 and 10 years of age. In 10-year-old girls the global ratio of success was only 18%. In boys the ratios of success had also a tendency to diminish along age. In 10-year-old boys the global ratio of success was 39%.

2. Material and Methods

2.1 Sample

The sample comprises 3742 children of both genders between 6-to-10 years of age from Azores islands Portugal, which is approximately 25% in each gender and age of the residents in each island

Age	Boys	Girls	Total
6	269	286	555
7	431	453	884
8	428	464	892
9	460	429	889
10	241	281	522
Total	1829	1913	3742

2.2 Physical Fitness Evaluation

HPF was evaluated with FITNESSGRAM:

- 1-mile run/walk,
- curl-ups,
- push-ups,
- trunk lift.

FITNESSGRAM is a health related physical fitness test battery. Subjects are compared not to each other, but to health fitness standards, i. e, the evaluation is related to the criterion. For each test item there are 3 zones: 0-needs improvement, 1-healthy fitness zone, 2-very good. We calculated the percentage of children in each zone.

2.3 Obesity Evaluation

The children were evaluated in height and weight and then the BMI (weight in kilograms divided by the square of height in meters $\text{kg}\cdot\text{m}^{-2}$) was calculated.

To classify the children as obese or non-obese we used the cut values proposed by Cole et al. (2000)

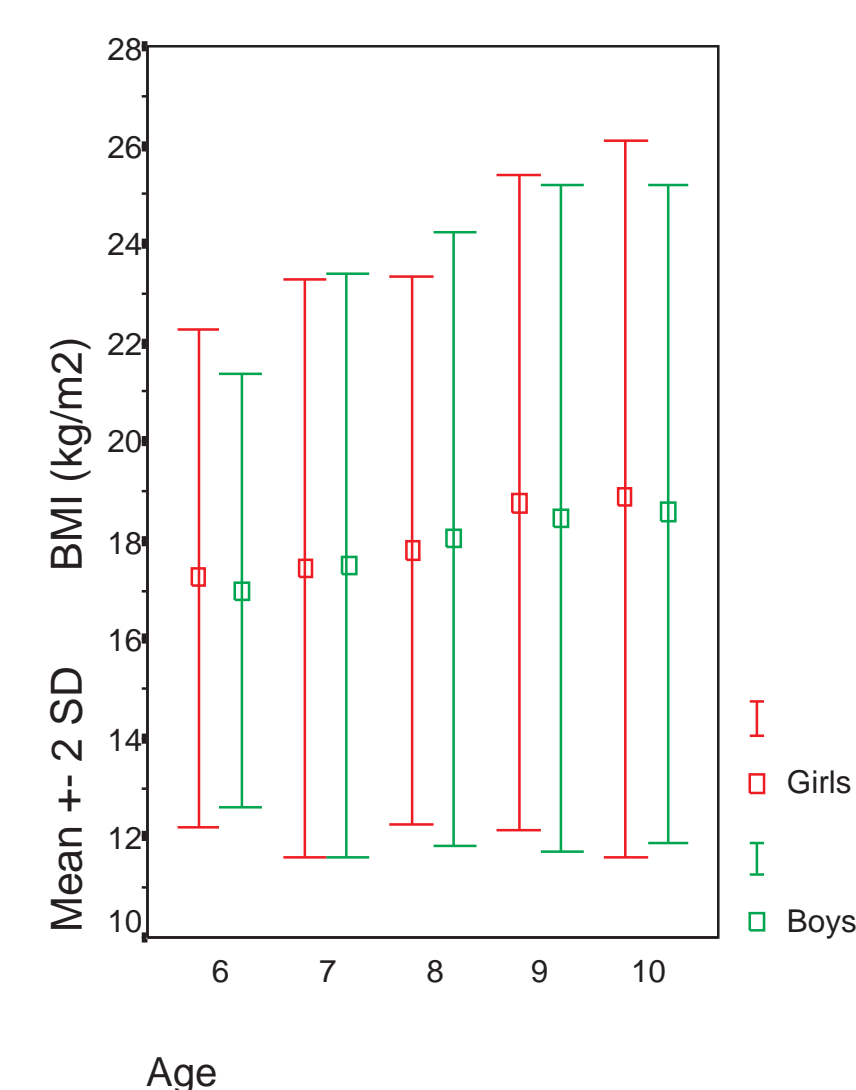
2.4 Statistical Procedures

The difference between obese and non-obese in HPF was analysed with MANCOVA, with age as covariate.

Percentage of children obese and no obese by gender and age according the cut values proposed by Cole et al. (2000)

Gender	Age	Obese	No obese
Girls	6	13,0	87,0
	7	13,7	86,3
	8	11,9	88,1
	9	10,9	89,1
	10	11,6	88,4
Boys	6	11,2	88,8
	7	13,0	87,0
	8	12,5	87,5
	9	11,9	88,1
	10	8,2	91,8

Mean and standard deviation of BMI by gender and age



We found that the prevalence of obesity was between 10.9% and 13.7% for girls, and between 8.2% and 13% for boys.

The results of MANCOVA show that obese children of both genders have lower HFP levels than no obese children (girls: $\lambda = 0.887$; $F(4, 1782) = 51.05$; $p < 0.001$; boys: $\lambda = 0.852$; $F(4, 1880) = 81.37$; $p < 0.001$)

4. Conclusions

There is a high prevalence of obesity in children of both genders from Azores islands.

The failure in passing the rates of FITNESSGRAM tests is relatively high.

The obese children have lower HPF levels than non-obese children.

5. References

COLE, T. J.; BELLIZZI, M. C.; FLEGAL, K. M.; DIETZ, W. H. (2000). Establishing a standard definition for child overweight and obesity worldwide: International survey. *British Medical Journal*. 320(6): 1240.