

SOME ANTHROPOMETRIC INDICATORS AND THE NUTRITIONAL STATUS OF THE PUPILS FROM 6 TO 10 YEARS OLD IN QUY NHON CITY, BINH DINH PROVINCE

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Abstract

Objective: assessing some anthropometric indicators and nutritional indexes of pupils from 6 to 10 years old in Quy Nhon City, Binh Dinh Province. **Method:** The study was conducted on 2,335 pupils (including 1,180 males and 1,155 females) using a cross-sectional description. **Results:** The average height of children from 6-10 years old in Binh Dinh Province is 119.15 cm; 124.39 cm; 129.78 cm, 134.78 cm and 140.73 cm. The average weight is 25.84 kg; 28.11 kg; 33.17 kg; 35.05 kg and 39.39 kg. Primary pupils in Quy Nhon City, Binh Dinh Province, have an overweight and obesity rate of 57.08%, which is quite high compared to the whole country and in the region. **Conclusion:** The height and weight of pupils in Binh Dinh province gradually increases from 6 to 10 years old. Overweight and obese pupils account for a high proportion, in which the proportion of overweight and obese male pupils is higher than female pupils.

Keywords: Primary pupils, Quy Nhon, anthropometric indicators.

1. INTRODUCTION

Human growth and development go through many stages, of which the childhood period has the most important meaning because this is the foundation stage for later development [4]. Anthropometry is one of the biological indicators showing growth and development in humans. For children, the anthropometric indicator also shows the growth rate and nutritional status of children, contributing to the orientation for the development and stature of the Vietnamese people. In recent years, malnutrition among children in our country has tended to decrease but overweight and obesity are on the rise in urban areas [7], which has negatively affected on child growth. Therefore, on April 28, 2011, the Prime Minister issued "The overall project on physical development and stature of Vietnamese people in the period of 2011 - 2030". In order to supplement

the biological value of Vietnamese people, we conduct research on some basic anthropometric criteria of primary school age students, thereby assessing the nutritional status of children through the study "Some anthropometric indicators and the nutritional status of pupils from 6 to 10 years old in Quy Nhon City, Binh Dinh Province".

2. METHODS

2.1. Subjects and research duration

- Our research subjects are pupils from 6 to 10 years old of some primary schools in Quy Nhon City, Binh Dinh Province. Pupils who are of normal psychological health, present at surveys and of appropriate age.

- Study duration: October 2017 to May 2018.

2.2. Sampling method and sample size

- The sample size was selected randomly and large samples were selected based on basic investigations in biomedicine. Samples were selected with the following steps [5], [6]:

+ Step 1: Calculate sample size by the formula

$$n_1 = Z_{1-\alpha/2}^2 \frac{p(1-p)}{d^2} DE$$

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In which: n_1 is the smallest research sample size to be achieved for each grade; p is the normal pupil rate, choose $p = 87.3$ [6]; d is the absolute error, choose $d = 0.05$; $Z_{1-\alpha/2}$ is the reliability coefficient corresponding to 95% reliability = 1.96; DE is a sample design coefficient = 2; replacing in the formula we have: $n_1 = 341$.

+ Step 2: There are 5 grades so the sample size for the study is $n_2 = n_1 \times 5 = 1,705$.

+ Step 3: Expected to give up 10%, so the

sample size to be collected is $n = 1,705 + (1,705 \times 10)/100 = 1,876$ pupils. The investigated sample size that is satisfactory is 2,335 ($> 1,876$), so the reliability is guaranteed.

- Sampling method: there are 25 primary schools in Quy Nhon City, we randomly select 4 schools: Hai Cang Primary School, Ly Thuong Kiet Primary School, Ngo May Primary School and Tran Phu Primary School. The sample is distributed as table 2.1

Table 2.1. Distribution of research samples by gender, age and location

Gender	6	7	8	9	10	Total
Male	227	273	211	228	241	1,180
Female	243	204	235	218	255	1,155
Total	470	477	446	446	496	2,335

2.3. Measurement the height, weight and nutritional status

Height: Using a UNICEF wooden ruler to measure pupils' height with an accuracy of 0.1 cm. When measuring, pupils stand on a flat ground, their heels close together, their eyes look straight, ensure that 4 points: occipital, back, buttocks and heels touch the ruler. The upright posture is determined when the canthus and the upper edge of the ear rim are in the same horizontal line. The pupil stands upright, the shoulders and arms are free on either side of the person, knees do not sag, move the bar of the scale silently until it touches the top of the head of the child. When reading, the eye of the measuring person must be equal to the bar of the scale [1], [2], [9].

Weight: Using a Japanese TANITA scale with an accuracy of 0.1kg. The scale should be placed on the horizontal plane. Before each weighing, check the accuracy of the scale. The pupils stand upright on the scale so that the body focus falls on the center of the scale. When weighing, the child wears thin clothes, no hats, shoes, sandals, away from

meals and stands still in the middle of the scales [1], [2], [9].

Nutritional status by BMI: Evaluation of nutritional status: based on BMI, by age and gender compared to the reference population of WHO (2007) [10]

- Severe underweight: $BMI < -3SD$;
- Moderate underweight: $-3SD \leq BMI < -2SD$;
- Normality: $-2SD \leq BMI \leq +1SD$
- Overweight: $+1SD < BMI \leq +2SD$;
- Obesity: $BMI > +2SD$.

2.4. Data analysis: The data is in 2 steps is to filter the reasonable data, then process by Epi Data 3.1 software and transfer to Stata 10.0 software for analysis. Use the Student's t test to test the difference between two means of two groups

2.5. Ethics: The study strictly complies with the regulations, principles and standards of ethics in biomedical research of Vietnam, in line with the general international standards. The study is not dangerous and adversely affects the research subjects. All participants voluntarily participated. All data collected if it is personal is kept confidential.

3. RESULTS AND DISCUSSIONS

3.1. The height of primary pupils by age and gender

The result of the study of the height of 2,335 primary pupils in Quy Nhon city, Binh Dinh Province is shown in Table 3.1

Table 3.1 shows that the height of pupils increases from 6 to 10 years old. 6-year-old children have an average height of 119.15 ± 5.63 cm and 10-year-old children of 140.73 ± 6.68 cm. Females have higher annual growth rate than males (5.63 cm/year for females, 5.14 cm/year for males); males are taller than females ($p > 0.05$) at the age of 6 and 8 but at 9 and 10 years of age, females are taller than males ($p > 0.05$). This may be because girls get puberty earlier than boys so their height soars early. Comparing with a number of domestic and foreign research results, we realize that the group of pupils in our study is taller than pupils in Thu Dau Mot City (2015) and pupils of many previous research in our country [2], [3]. Compared to the research results of WHO (2007) [10] and CDC (2007-2010) [9], the pupils in our study are also shorter in all age groups, even though these studies were conducted many years ago ($p < 0.05$).

3.2. Weight of primary pupils by age and gender

Besides height, weight is also a basic anthropometric indicator that clearly shows the growth of children. The results of the pupils' weight in Quy Nhon City, Binh Dinh Province are shown in Table 3.2.

Table 3.2 shows that the weight of the child increases over the years. At the age of 6, Quy Nhon pupils in Binh Dinh Province had an average weight of 25.84 ± 5.34 kg but by the age of 10 was 39.39 ± 10.65 kg. Average annual increase of 3.39 kg, of which the male has an average growth rate higher than that of females (male increases 3.56 kg/year and female is 3.22 kg/year). The weight of girls increases rapidly at age 8, boys increase rapidly at age 10, this may be because girls have puberty earlier than boys.

Quy Nhon pupils in Binh Dinh Province have an increasing weight from 6 to 10 years old, consistent with previous studies [1], [2], [3], [9]. At all ages, Quy Nhon pupils in Binh Dinh Province have higher weight in the domestic research results in 2002, 2003, 2009, 2013, 2015 (with $p < 0.05$) and also higher when compared with the research results of foreign organizations such as NCHS (1981) and WHO (2007) but lower than the weight of American pupils of the same age in the study of CDC (with $p < 0.05$) [9].

Table 3.1. The height of Quy Nhon primary pupils in Quy Nhon city Binh Dinh Province

Age	Total (n= 2,335)		Male (n= 1,180)		Female (n= 1,155)		(3) - (2)	p
	Value (1)	Δ	Value (2)	Δ	Value (3)	Δ		
6	119.15 ± 5.63	-	119.49 ± 5.18	-	118.83 ± 6.02	-	0.66	>0.05
7	124.39 ± 6.23	5.24	125.15 ± 6.10	5.66	123.37 ± 6.27	4.54	1.78	>0.05
8	129.78 ± 5.85	5.39	130.07 ± 5.88	4.92	129.52 ± 5.83	6.15	0.55	>0.05
9	134.78 ± 5.82	5.00	134.69 ± 5.52	4.62	134.87 ± 6.13	5.35	- 0.18	>0.05
10	140.73 ± 6.68	5.95	140.06 ± 6.23	5.37	141.36 ± 7.03	6.49	- 1.30	>0.05
Increase /year		5.40		5.14		5.63		

Table 3.2. The weight of pupils in Quy Nhon City, Binh Dinh Province

Age	Total (n ₁ = 2,335)		Male (n ₂ = 1,180)		Female (n ₃ = 1,155)		(3) - (2)	p
	Value (1)		Value (2)		Value (3)			
		Δ		Δ		Δ		
6	25.84 ± 5.34	-	26.77 ± 5.54	-	24.98 ± 5.01	-	1.79	>0.05
7	28.11 ± 6.75	2.27	29.59 ± 7.14	2.82	26.12 ± 5.62	1.14	3.47	>0.05
8	33.17 ± 7.01	5.06	32.83 ± 7.68	3.24	33.49 ± 7.15	7.37	-1.05	>0.05
9	35.05 ± 7.60	1.88	36.17 ± 8.20	3.34	33.89 ± 6.52	0.40	0.40	>0.05
10	39.39±10.65	4.34	41.02 ±12.50	4.85	37.84 ± 827	3.95	3.18	>0.05
Increase /year		3.39		3.56		3.22	3.39	

Table 3.3. Nutritional status of primary pupils by gender

Nutritional status	Total (n= 2,335)		Male (n= 1,180)		Female (n= 1,155)	
	n	%	n	%	n	%
Severe underweight	17	0.73	7	0.59	10	0.87
Moderate underweight	35	1.50	18	1.53	17	1.47
Normality	950	40.69	403	34.15	547	47.36
Overweight	635	27.19	268	22.71	367	31.77
Obesity	698	29.89	484	41.02	214	18.53

Based on height and weight criteria, we determine BMI, from that we assess the nutritional status of pupils through Table 3.3 and in Table 3.4.

3.3. Nutritional status of pupils in Quy Nhon City, Binh Dinh Province

The nutritional status of 2,335 primary pupils in Quy Nhon City, Binh Dinh Province is shown in Table 3.3 and in Table 3.4.

Table 3.3 shows that underweight pupils account for 2.23% of which severe

underweight and moderate underweight are at 0.73% and 1.50% respectively. The rate of underweight among boys and girls is 2.12% and 2.34%. However, the proportion of overweight and obese children is quite high, accounting for 57.08%; in which male pupils account for a high rate of 63.73% and female pupils are 50.30%; This is a quite high rate compared to the country and the region today. By age, the 6-year-old has the highest obesity rate and the lowest is the 10-year-old children.

This shows that obesity is tending to rejuvenate.

Before 1995 in Vietnam, there were not high rate of overweight and obesity but nowadays there were continuous studies on this issue of nutritional status. In 2009, Tay Ninh primary pupils had a ratio of overweight - obesity of 34.0% [6] ... In 2012, a survey in Ho Chi Minh city showed that the ratio of overweight - obesity of Ho Thi Ky Primary School was 54.4% and Phu Hoa Dong Primary School was 31.2% [8] In 2015, the results of overweight - obesity study of over 500 pupils at Thinh Quang Primary School in Dong Da District, Hanoi showed that the

average ratio of overweight was 38.2%. Also in this year, a result of a study of 470 pupils in grade 4 at a primary school in Hai Phong found that 49.3% of children had overweight [8] ... Thus, the situation of overweight and obese children is increasing year by year in many parts in the country. This is an issue that we should pay proper attention as it will result in an increase in the rate of cardiovascular disease, diabetes, blood pressure, dyslipidemia, osteoarthritis or even cancer in the future [6], [7], [8]. Thus, obesity tends to rejuvenate, this is an unhealthy phenomenon in terms of public health and future generations.

Table 3.4. Nutritional status of primary pupils by age

Nutritional status	Age									
	6		7		8		9		10	
	n	%	n	%	n	%	n	%	n	%
Severe underweight	4	23.53	4	23.53	2	11.76	3	17.65	4	23.53
Moderate underweight	7	20.00	8	22.86	7	20.00	6	17.14	7	20.00
Normality	182	19.16	187	19.68	181	19.05	196	20.63	204	21.47
Overweight	116	18.27	122	19.21	129	20.31	128	20.16	140	22.05
Obesity	176	25.23	145	20.77	156	22.35	115	16.48	106	15.17

4. CONCLUSION

- Anthropometric indicators of pupils from 6 to 10 years old in Quy Nhon city, Binh Dinh province increase with age. The average height of children from 6 to 10 years old is 119.15 cm; 124.39 cm; 129.78 cm, 134.78 cm and 140.73 cm respectively. The average weight is 25.84 kg; 28.11 kg; 33.17 kg; 35.05 kg and 39.39 kg respectively.

- The situation of malnourished children accounts for 2.23%, however, the rate of overweight and obese children is quite high, accounting for 57.08%; in which male pupils

account for 63.73% and female are 50.30%.

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REFERENCES

1. Bộ Y tế (2003), Các giá trị sinh học người Việt Nam bình thường thập kỷ 90 - thế kỷ XX, NXB Y học, Hà Nội.

2. **Trần Long Giang, Mai Văn Hưng (2013)**, Nghiên cứu một số chỉ số hình thái của học sinh từ 6 - 17 tuổi tại tỉnh Yên Bái, tạp chí Y học Việt Nam, 141:45 - 57.
3. **Nguyễn Thị Thu Hiền, Nguyễn Thị Thúy Hiệp (2015)**, Nghiên cứu thể lực của học sinh tiểu học ở thành phố Thủ Dầu Một, tỉnh Bình Dương, Tạp chí Đại học Thủ Dầu Một, 22:43 - 50.
4. **Nguyễn Thị Thu Hậu (2011)**, Bí quyết dinh dưỡng giúp trẻ tăng chiều cao tối ưu, NXB Phụ nữ.
5. **Nguyễn Trương Nam (2014)**, Phương pháp xác định cỡ mẫu, Viện nghiên cứu Y - Xã hội học.
6. **Trần Đình Thoan, Nguyễn Thị Hạnh (2013)**, Nhận xét về tình trạng dinh dưỡng ở trẻ em tiểu học huyện Tiền Hải, Thái Bình qua một số chỉ số nhân trắc, Tạp chí Y học thực hành, 5(869):155 - 157.
7. **Võ Văn Toàn (2009)**, Nghiên cứu tình trạng suy dinh dưỡng, béo phì ở trẻ em tiểu học tại Bình Định và đề xuất các biện pháp phòng tránh. Đề tài Khoa học và Công nghệ cấp Bộ, Trường Đại học Quy Nhơn.
8. **Ngô Thị Xuân, Phạm Trung Kiên, Nguyễn Thị YẾN, Nguyễn Thị Lâm (2015)**, Tỷ lệ thừa cân, béo phì học sinh tiểu học thành phố Bắc Ninh năm 2015, Tạp chí Nhi khoa, 8(5):56 - 60.
9. **CDC (2012)**, Anthropometric reference data for children and adults: United states, 2007 -2010, Hyattsville, Maryland, DHHS Publication No. (PHS) 2013 - 1602.
10. **World Health Organization (2007)**, Height - for - age Girls (Boys) 5 to 19 years, weight - for - age Girls (Boys) 5 to 19 years and BMI - for - age Girls (Boys) 5 to 19 years (percentiles).

TÓM TẮT

MỘT SỐ CHỈ TIÊU NHÂN TRẮC VÀ TÌNH TRẠNG DINH DƯỠNG CỦA HỌC SINH TỪ 6 – 10 TUỔI THÀNH PHỐ QUY NHƠN TỈNH BÌNH ĐỊNH

Nguyễn Thị Tường Loan

Đại học Quy Nhơn

Mục tiêu: đánh giá một số chỉ tiêu nhân trắc của học sinh từ 6 - 10 tuổi tại thành phố Quy Nhơn, tỉnh Bình Định. **Phương pháp:** Nghiên cứu được tiến hành trên 2.335 học sinh (gồm 1.180 nam và 1.155 nữ), phương pháp mô tả cắt ngang có so sánh. **Kết quả:** Chiều cao trung bình của học sinh từ 6 - 10 tuổi ở tỉnh Bình Định là: 119,15 cm; 124,39 cm; 129,78 cm, 134,78 cm và 140,73 cm. Cân nặng trung bình lần lượt là: 25,84 kg; 28,11 kg; 33,17 kg; 35,05 kg và 39,39 kg. Học sinh tiểu học thành phố Quy Nhơn tỉnh Bình Định có tỷ lệ thừa cân, béo phì là 57,08%, tỷ lệ này là khá cao so với cả nước và trong khu vực. **Kết luận:** Chiều cao, cân nặng của học sinh tỉnh Bình Định tăng dần từ 6 đến 10 tuổi và tình trạng thừa cân, béo phì chiếm tỷ lệ cao, trong đó tỷ lệ học sinh nam thừa cân, béo phì cao hơn học sinh nữ.

Từ khóa: Học sinh tiểu học, Quy Nhơn, chỉ số nhân trắc.