

**RESEARCH ON SOME ANTHROPOMETRIC MEASUREMENTS
AND INDEXES OF HIGH SCHOOL STUDENTS
IN CAN THO CITY FROM 2019 TO 2021**

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ABSTRACT

Background: Anthropometry is a part of physical anthropology, a science that allows the study of measurement methods on the human body and the use of mathematics to analyze the measured results in order to find patterns about human physical development. Measurement of the human body is one of the methods of assessing the general health and nutritional status of an individual or a population. **Objectives:** to confirm the anthropometric measurements and indexes of high school students in Can Tho city from 2019 to 2021. **Materials and methods:** a longitudinal section descriptive study in 400 high school students in Can Tho city from September 2019 to September 2021. The sample size was selected according to the cluster sampling method. **Results:** The growth in weight, vertical height, sitting height in our study was more than the growth over 20 years ago of students in the longitudinal study by Tham Thi Hoang Diep, the difference was statistically significant with $p < 0.05$. The weight of male and female both increased gradually over the years. Compared with the report of Nguyen Phi Hung in Can Tho city in 1999 the average weight, vertical high and sitting high also increased for each age group, the difference was also statistically significant with $p < 0.01$. BMI index of male and female are similar at each age, the difference is not statistically significant with $p > 0.05$. BMI is in the normal range according to the WHO grading scale for ages 5-19. the physical fitness of Vietnamese students is equivalent to that of China, higher than African countries but still lower than other countries in the Europe and America. Compared with the research results of Nguyen Phi Hung and Le Dinh Van more than 20

years ago, our study has a significant growth in length. Lower extremities were at the level of long legs after puberty (statistically significant difference $p < 0.01$ for each age). **Conclusions:** The anthropometric measurements and indexes of male students are higher than that of female students ($p < 0.05$). The anthropometric measurements and indexes are significantly improved compared to previous studies ($p < 0.05$). Skelie indexes in the study show that children have long to very long legs (from 90 to over 100). Thus, the height growth, mainly the length of the lower limbs, is significantly improved. The physical fitness of Vietnamese students is equivalent to that of China, higher than African countries but still lower than other countries in the Europe and America.

I. INTRODUCTION

Anthropometry is a part of physical anthropology, a science that allows the study of measurement methods on the human body and the use of mathematics to analyze the measured results in order to find patterns about human physical development.

Measurement of the human body is one of the methods of assessing the general health and nutritional status of an individual or a population.

The study of human fitness indicators in particular and the evaluation of anthropometric indicators in general is a very important activity in the process of researching human development fields. This is an activity that serves as a basis and a premise for the development of standards on measurements and dimensions in order to manufacture and produce tools and means of daily living.

* Objectives:

To confirm the anthropometric measurements and indexes of high school students from 2019 to 2021 in Can Tho city.

II. MATERIALS AND METHODS:

* Research subject

High school students in Can Tho city satisfied the sampling criteria from September, 2019 to September, 2021

Inclusion criteria: 15-year-old students who are in healthy condition and accept to join in the study during 3 years in September, 2019.

Exclusion criteria

- All of the students have malformations, congenital or acquired abnormalities that affect to the anthropometric measures such as kyphosis, scoliosis, muscular atrophy...

- All of the students are in acute or chronic diseases that affect to the physical development such as asthma, tuberculosis, edema, anemia...

* Research method

Research design: a longitudinal section descriptive study

Sample size and sampling method: cluster sampling.

$$n = \frac{Z_{(1-\alpha/2)}^2 \times \sigma^2}{d^2} \Rightarrow n=385$$

Sampling method: select the cluster sampling as follows:

In each district in Can Tho city, a random selection was conducted to select 1 high school.

- In each selected school, similar random drawing was conducted to select any number of classes in grade 10 so that the required number of the sample is sufficient.

*** Research content:**

- To confirm the anthropometric measures: weight, vertical height, sitting height of the same group of students. This activity would be repeated in the same time from 2019 to 2021.
- To confirm the anthropometric indexes: BMI, Skelie of students.

III. RESULTS

Participants included 400 students (female: 228 (57%) and male: 172 (43%)) in every year from 2019 to 2021.

3.1. The anthropometric measures of high school students

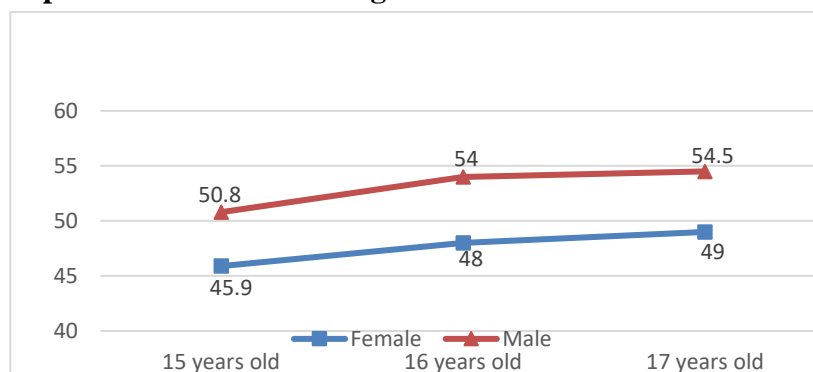


Figure 1. The weight of students from 2019 – 2021

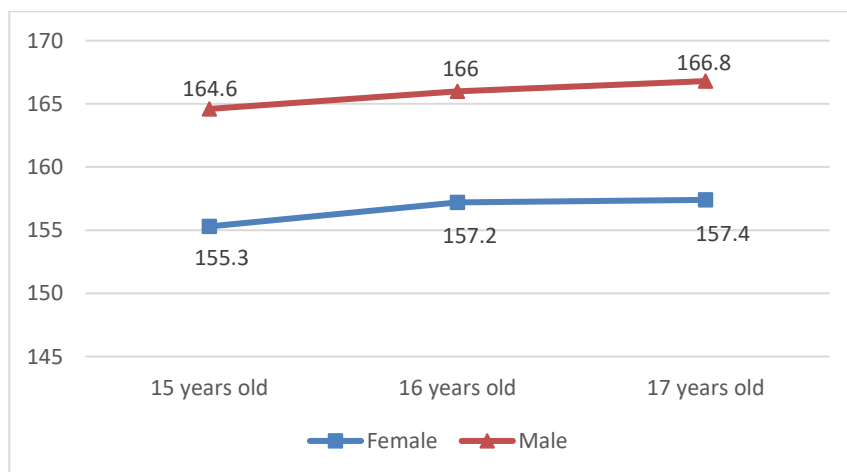


Figure 2. The vertical height of students from 2019 – 2021

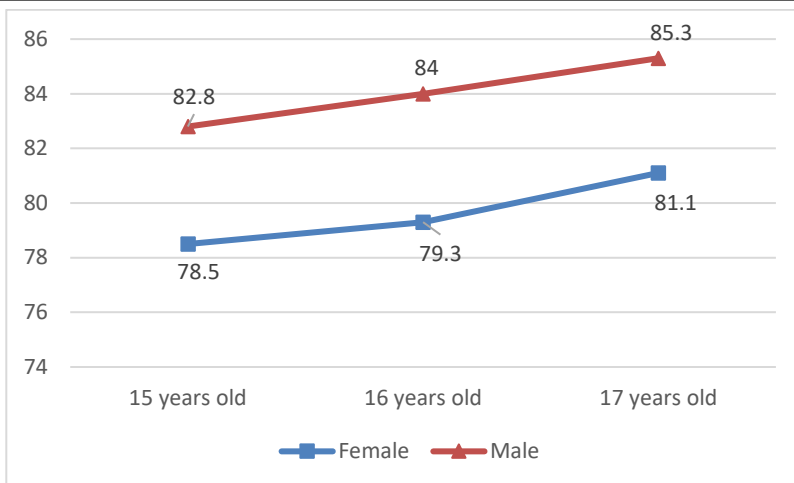


Figure 3. The sitting height of students from 2019 – 2021

3.2. The anthropometric indexes of high school students

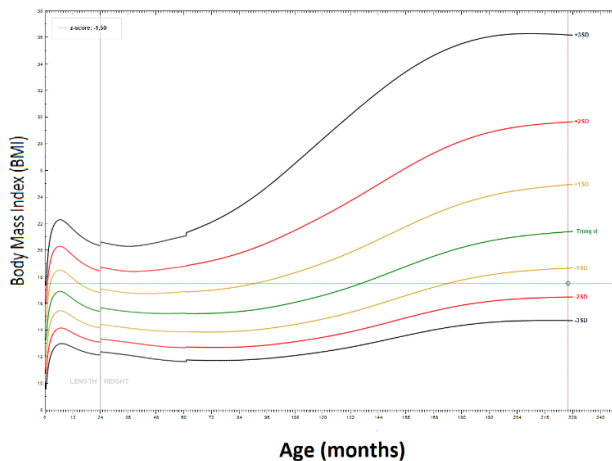


Figure 4. BMI distribution of female (Z-score = -1,5).

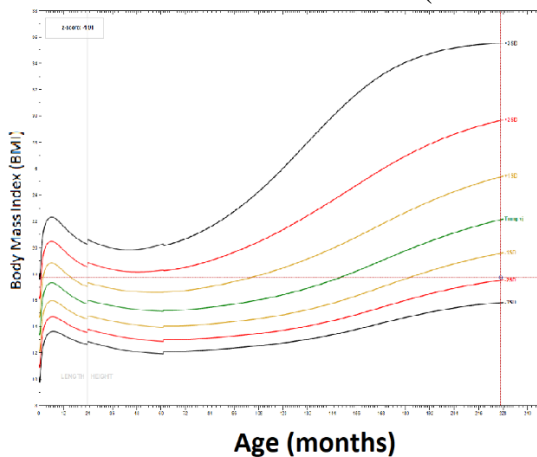


Figure 5. BMI distribution of male (Z-score = -1,91).

Table 1. Female Skelie rating percentage

Age	Short leg	Medium leg	Long leg
15	<84.9 (22.6%)	85-89.9 (17.4%)	>90 (60%)
16	<84.9 (12.1%)	85-89.9 (21.8%)	>90 (66.1%)
17	<84.9 (9.3%)	85-89.9 (17.8%)	>90 (72.9%)

Table 2. Male Skelie rating percentage

Age	Short leg	Medium leg	Long leg
15	<84.9 (17.9%)	85-89.9 (16.4%)	>90 (65.7%)
16	<84.9 (12.8%)	85-89.9 (11.8%)	>90 (75.4%)
17	<84.9 (6.9%)	85-89.9 (12.5%)	>90 (80.6%)

IV. DISCUSSION

4.1. The anthropometric measurements of high school students

Table 3. Comparison of male and female weight, vertical high and sitting high growth from 15 to 16 year old in our study and the 1992 study

	Sex	Our research	Tham Hoang Diep (1992)	p
Weight	Female	3.1	0.8	0.008
	Male	3.7	0.6	0.007
Vertical high	Female	2.1	1.1	0.007
	Male	1.4	0.9	0.008
Sitting high	Female	1.6	0.9	0.006
	Male	1.2	0.7	0.002

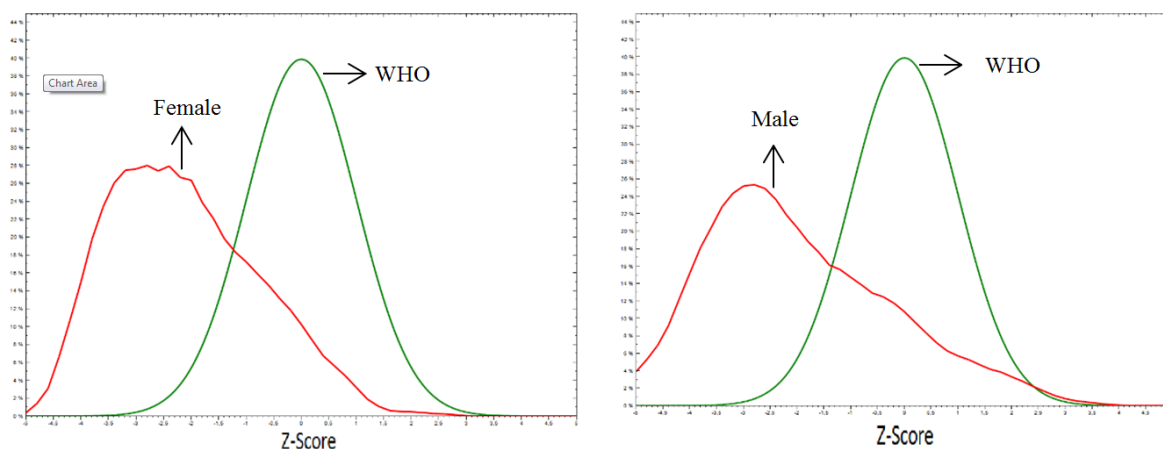


Figure 6. Compare the weight of male and female in our study and WHO

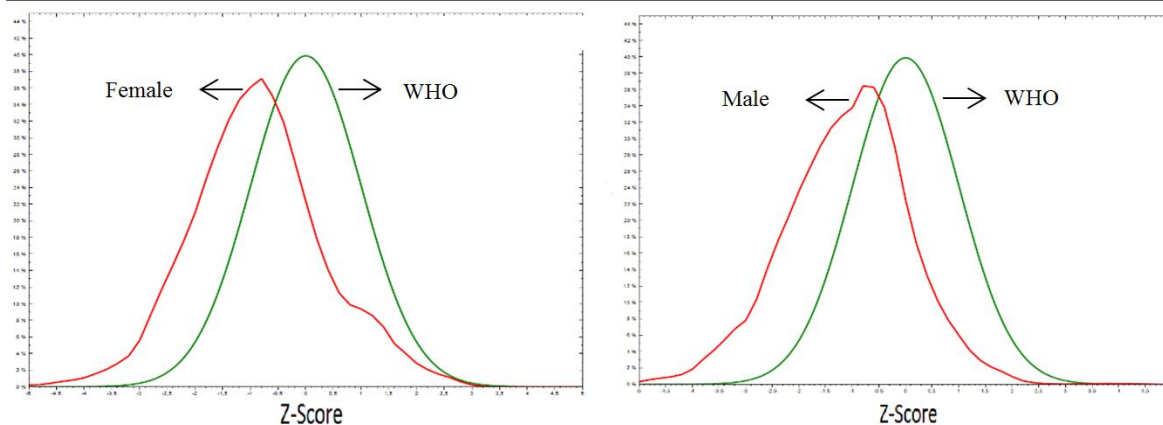


Figure 7. Compare the vertical high of male and female in our study and WHO

The growth in weight, standing height, sitting height in our study was more than the growth over 20 years ago of students in the longitudinal study by Tham Hoang Diep, the difference was statistically significant with $p < 0.05$. The weight of male and female both increased gradually over the years. Compared with the report of Nguyen Phi Hung in Can Tho city in 1999 [6] the average weight, vertical high and sitting high also increased for each age group, the difference was also statistically significant with $p < 0.01$. In 2002, Le Dinh Van [3], [4], [5] published the child's measurements showing that the anthropometric measures was less than our study, the difference was statistically significant with $p < 0.01$ for each age group. In 2018, the author Melissa D. Olfert [9] published an article that measured young people in the United States can see that their weight and vertical high were higher than ours in 2019, statistically significant difference with $p < 0.01$.

4.2. The anthropometric indexes of high school students

BMI index of male and female are similar at each age, the difference is not statistically significant with $p > 0.05$. BMI is in the normal range according to the WHO grading scale for ages 5-19. Compared with studies over 20 years ago by Le Dinh Van, Nguyen Huu Chinh [7], Nguyen Phi Hung, our BMI is 1-3 higher in each sex for each age group (statistically significant difference $p < 0.05$). In 2003, Aneesa M Al-Sendi's study [1], [2] on children 12-17 years old in Bahraini had a greater tendency to obesity in the period from 1986 to 2000, BMI was higher than our study (the difference is Statistical significance $p < 0.05$ for each age group). Average BMI of adolescent students aged 12-17 in Egypt in 2010 for both boys and girls aged 20-21, is higher than our study in 2020 ($p < 0.05$ for each age group). Recently, in 2018, Ratko Pavlovic [10] published a study on 17-year-old students in Montenegro, a country in Southeast Europe, whose average weight, height and BMI were higher than our study ($p < 0.05$). Meanwhile, the indicators of Chinese students [17] are equivalent to our research. Thus, the physical fitness of Vietnamese students is equivalent to that of China, higher than African countries but still lower than other countries in the Europe and America. This can be explained by the genetic factors of the races as well as the best economic conditions in Europe and the Americas, the least developed in Africa, so the measurements and fitness indexes in our study I am equivalent to countries in the same region but there are differences compared to studies in other continents.

Compared with the research results of Nguyen Phi Hung and Le Dinh Van more than 20 years ago, the length of the lower limbs through the Skelie index is the average leg from 11 years old onwards, our study has a significant growth in length. Lower extremities were at the level of long legs after puberty (statistically significant difference $p < 0.01$ for each age).

V. CONCLUSION

Throughout a longitudinal section descriptive study in 400 high school students in Can Tho city from September 2019 to September 2021, we confirm the following conclusions:

- The anthropometric measurements and indexes of male students are higher than that of female students ($p < 0.05$).

- The anthropometric measurements and indexes are significantly improved compared to previous studies ($p < 0.05$).

- Skelie indexes in the study show that children have long to very long legs (from 90 to over 100). Thus, the height growth, mainly the length of the lower limbs, is significantly improved.

- The physical fitness of Vietnamese students is equivalent to that of China, higher than African countries but still lower than other countries in the Europe and America. It can be concluded that a lot of attention should be paid to nutrition and health care programs for high school students.

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