VNU Journal of Science, Natural Sciences and Technology 24 (2008) 50-55

The impact of environment on morphological and physical indexes of Vietnamese and South Korean students

Mai Van Hung*, Sunyoung Pak
Seoul National University, Korea

Received 25 October 2007

Abstract. Researches were carried out on 916 male students and 910 female Korean students at the age of from 20 to 25 in Seoul National University, South Korea. The results show that in general, the basic morphological and physical indexes of students of South Korea are approximately equal to the average standard of the world's youth now and the Korean students have anthropometric indexes better than Vietnamese students. For reasons that effect to anthropometry index of South Korean students, except for the influences of genetic, endocrine and race. The environment, including Location, Geography, & Climate, regimen, Psychology, Physical exercise, etc., are important factors which have effects on health, and morphology and physical status of students.

1. Introduction

Most of the previous researches showed that the values of morphological and physical indexes are influenced by the environment. H. Nygard et al, studied on the musculoskeletal capacity of employees from 44 to 58 in physical, mental and mixed types of work in European [1]. Sunnegardh and E. Bratterby have found that the maximal oxygen uptake, anthropometry and physical activity of 8 and 13 years old children in Sweden [2], the Midtby et al, study on the variation in bone formation markers with age, gender, anthropometry and season in both men and women [3]. Ritsuko Imamura et al studied on effects of wearing long and mini-skirt for a year on subcutaneous fat thickness and body circumference [4]

Annie C. Wetter and Christina D. Economos, study on the skeletal status in young adulthood may require more specific moderate to vigorous physical activity [5]. Roderic Floud, John Komlos, Richard Steckel and Kenneth Sokoloff have studied economic welfare index by human stature have shown that height, at maturity is a reliable proxy indicator of health and nutritive condition and that socioeconomic factor as well as hereditary, environmental factor affects the growth of height. Lauderdale DS and Rathouz PJ study on the effects of nativity, years since immigration and socioeconomic status on dimensional body is importance [6].

In Vietnam, there have been many research projects on these problems; for example: "Vietnamese' physiologic constants in 1975" by Nguyen Tan Gi Trong et al [7], "Vietnamese' Anthropometry in 1990", "Project KX 07-07 in 1994", "Atlats Vietnameses' Anthropometry in 1985" or the surveys conducted in some areas, provinces, schools, colleges, universities by other physiology scientists. Some other researches

* Corresponding author. Tel.: 84-0211-863202.
E-mail: drmaihung@yahoo.com

done at a smaller level are "Proposal of new indexes and classification of robusticity of Vietnamese adults" by Le Gia Vinh, Vo Hung et al, "Morphological human races and physical of Ede's males in Tay Nguyen" by Mai Van Thin, "Some morphological and physical indexes of learners of Thanh Hoa Teachers Training College" by Mai Van Hung, " The indexes of morphological human races and physical of north Vietnam people adults '90" by Trinh Van Minh, Tran Sinh Vuong et al, "A survey of human races of youth and students" by Le Nam Tra et al,.[8] Most of the previous researches showed that the values of morphological and physical indexes are influenced by the environment especial "the values of Vietnamese' biology in '90th century XX" by Ministry of Health, Vietnam [9] .

2. Objectives

Form and physical force are the important indexes from to assess health status. They show a part of actual body status and the relationship between human physiology and environmental factors such as climate, season, nutrition, activities, economy, urbanization, and stress. Most of the previous researches showed that the values of morphological and physical indexes are influenced by the environment.

Therefore, the purpose of this research is to identify environmental factors that effect to anthropometry of Korean students from there to find out the marked differences between anthropometric indexes of Korean students and Vietnamese students, at the same time to explain why the South Korean people got anthropometric index are better than Vietnamese's in recent decades.

3. Method

Researches were carried out on about 1000 male students and 1000 female Korean students aged 20-25 years old volunteered to be the research objects. All of them haven't suffered from malformation or chronic diseases in Seoul National University (Period: from 9/2006 to 6/2007). After then comparison of basic anthropometric indexes of Korean students and Vietnamese students (other our study in Vietnam before)

- Using the method of Martin and M.F. Ashley Montagu's method was used to measure Morphological indexes. This is a cross - sectional study. Every subject had been tested on the height, weight, measurement of middle chest (chest girth). The average values of the indexes were calculated based on the Button's formula.

4. Findings

Result

1. The reality of basic anthropometric indexes of Korean students

This description is based on 916 males and 910 females.

Table 1. Average basic anthropometric indexes of Korean students (X + SD)

No	Index	Male (n= 916)	Female (n=910)
1.	Height (cm)	174.51 ± 6.15	161.22 ± 5.18
2.	Weight (kg)	69.56 ± 5.45	57.43 ± 4.12
3.	Measurement of middle chest (cm)	91.62 ± 5.11	83.78 ± 7.87
4.	Pignet	13.56 ± 5.75	21.43 ± 6.22
5.	BMI	23.15 ± 1.79	22.26 ± 1.36

Table 1 shows average some anthropometric base indexes of males and females. The males' indexes of height, weight, measurement of middle chest, are higher than the females' ($p < 0.01$). This result shows the characteristics of sex.

2. The reality of basic anthropometric indexes of Vietnamese students

This description is based on 1000 males and 1000 females.

Table 2. Average basic anthropometric indexes of Vietnamese students (X + SD)

No	Index	Male (n = 1000)	Female (n=1000)
1.	Height (cm)	165.76 ± 6.55	155.22 ± 5.32
2.	Weight (kg)	53.62 ± 5.54	46.75 ± 4.67
3.	Measurement of middle chest (cm)	79.81 ± 5.46	72.53 ± 6.29
4.	Pignet	32.39 ± 3.26	35.97 ± 6.38
5.	BMI	19.88 ± 1.96	19.56 ± 1.67

Table 2 shows average some anthropometric base indexes of males and females. The males' indexes of height, weight, measurement of middle chest, are higher than the females' ($p < 0.01$). This result shows the characteristics of sex. However, there is not much difference between females and males of Vietnamese students as between females and males of Korean students.

3. Comparison of basic anthropometric indexes of Korean students and Vietnamese students

Average basic anthropometric indexes of Korean students and Vietnamese students are presented in Table 3 and Table 4.

Table 3. Average basic anthropometric indexes of males of Korean students and Vietnamese students (X + SD)

No	Index	Korean (n=916)	Vietnamese (n=1000)
1.	Height (cm)	174.51 ± 6.15	165.76 ± 6.55
2.	Weight (kg)	69.56 ± 5.45	53.62 ± 5.54
3.	Measurement of middle chest (cm)	91.62 ± 5.11	79.81 ± 5.46
4.	Pignet	13.56 ± 5.75	32.39 ± 3.26
5.	BMI	23.15 ± 1.79	19.88 ± 1.96

As shown in the above table, there was significant difference in the average basic anthropometric indexes of males such as height, weight, and so on between Korean students and Vietnamese student. Most of these indexes of Korean students are better than Vietnamese students.

Table 4. Average basic anthropometric indexes of females of Korean students and Vietnamese students (X + SD)

No	Index	Korean (n=910)	Vietnamese (n=1000)
1	Height (cm)	161.22 ± 5.18	155.22 ± 5.32
2	Weight (kg)	57.43 ± 4.12	46.75 ± 4.67
3	Measurement of middle chest (cm)	83.78 ± 7.87	72.53 ± 6.29
4	Pignet	21.43 ± 6.22	35.97 ± 6.38
5	BMI	22.26 ± 1.36	19.56 ± 1.67

The data are presented in Table 4. There was significant difference in the average basic anthropometric indexes of females such as height, weight, and so on between Korean students and Vietnamese student. Most of these indexes of Korean students are better than Vietnamese students.

5. Discussion

Average male height in Vietnamese and North Korean remains comparatively small at 5 ft 4 in (1.63 m) and 5 ft 5 in (1.65 m) respectively. Currently, young North Korean males are actually significantly shorter. While average male height in South Koreans are about 3 inches (8 cm) taller than their North Korean counterparts, on average. The difference between South Koreans, and even older North Koreans, compared to young North Koreans who grew up during the famine of the 1990s-2000s is extraordinary [10]. Thus, except for the influences of genetic and endocrine, especially regimen on human growth, we believed that The environment including many factors as Location, Geography, & Climate, regimen, Psychology, Physical exercise and so on are importance reasons as well which have influenced on students' health, and morphology and physical status of them

Our study also showed that anthropometry indexes of Korean students are better than Vietnamese students. Thus, why the basic anthropometry indexes of students of Vietnamese are smaller than the average standard level of students in the world, especially the average standard level of Korean students?

The location, geography, and climate: The marked difference of the location, geography, and climate between Korea and Vietnam, we believed that these different conditions have effect on human variation in body size and shape.

The amount of habitual physical activity has no effect on body height, but daily caloric expenditure can be a major determinant of weight. Increased physical activity or training can result in diminished levels of body fat and increased muscle mass, Bone mineralization responds directly to physical stressors, and some evidence indicates that adults who are more active are at less risk for osteoporosis. According to this theory, the different physical activity or training has effect on human variation in body size and shape adaptation to the different environment. Thus, characteristics distinguish of geography the Vietnam from the Korea shown us that these conditions can be different determinant of physical activity or training. Therefore, they have different effects on basic anthropometric indexes of human as height, weight index and so on.

The effects of climate on human variation in body size and shape conform to ecological 'ruler' of mammalian biological adaptation to the thermal environment. In hot environment, excess body heat produced by mammalian metabolism and voluntary muscular activity must be dissipated to the environment to avoid hyperthermic stress. Such loss many occur by radiation (direct transfer of infra-red energy from the body to a cooler object), conduction (heat exchange by direct physical contact between the body and cooler object), conviction (heat exchange between the body and a cooler object via an intermediary medium, e.g.air flow), or evaporation (conversion of water, e.g. perspiration, to vapor using body heat). Relatively low body weight, or body volume, and relatively large body surface area, produced by having legs and arms relatively long in proportion to the size of the trunk of the body, assist in heat loss. Low body volume decreases the amount of metabolizing tissue, and also decreases the distance required for the radiation of heat from the internal organs and muscles to the surface of the body. Large body surface area increases the potential for convection, conduction, and evaporation. In cold environments, a relatively large body volume and small surface area (i.e., relatively short

extremities in proportion to trunk size) is the body type best suited for heat retention. Body fatness, especially the thickness of the subcutaneous fat layer, may also increase in cold environments. Adipose tissue is relatively inert metabolically, due to poor vascularization, and acts as an insulating barrier against heat loss by radiation. In hot environments, a thin subcutaneous layer of fat helps minimize heat retention [11].

Thus, generally the basic anthropometric indexes of the North people are higher than the South people. For example: Europeans in North America were far taller than those in Europe in the eighteenth and nineteenth centuries, in fact the tallest in the world. The original indigenous population was also among the tallest populations of the world at the time. However, several nations, indeed many nations in Europe, have now surpassed the US in terms of average stature, particularly the Netherlands, and the Scandinavian nations. Most markedly is the Netherlands where average height has increased at the greatest rates. The Netherlands was in the late nineteenth century a land renowned for its short population, but today it has the tallest average in the world, with young men averaging 1.83 m tall and only shorter than the peoples of the Dinaric Alps, where males average 1.856 m tall. The Dutch are now well known in Europe for extreme tallness.

From the data about location and climate above and Barry Bogin's [11] study explain that, the Korean people have living belong among the North Asia people (around 37° North), during the Vietnamese people belong among the South Asia people (around 16° North). Therefore, the basic anthropometric indexes of Vietnamese people are not higher as Korean people.

About specific regimen of Korean: South Korea is one of the developed countries in the world while Vietnam is a developing country. This different is main cause effect on the quality and quantity of food everyday in this country and other, so this gives a different role to nutrition in developed countries compared with developing countries. For example, the food value of nutrition in developed countries is better than in developing country.

Psychological influences on human growth: In general, from after the War 1950 - 1953 to now, Korean's social environment have been peace and stable which is importance to establish Korean's psychosocial environment. While, before 1975 Vietnam were put on a war footing. From 1976 up to now, Vietnam has been peace and stable. In Vietnam, the highest increase occurs from 1975 to 1985 due to not only secular trend but also due to "catch - up". An explanation for this is that before 1975 when the Vietnam was in the war time, living conditions were poor and the environment was polluted. After that, living conditions were improved, which have led to rapid growth of human body (called catch - up). However, Vietnam is still poor country in the world. Additionally, the country continues to experience protests from various groups, so Vietnamese's psychosocial environment is worse than Korean's psychosocial environment. So, might be this is one of causes that influenced the anthropometric indexes of Vietnamese students bad to day.

Physical exercise of Korean students: Physical exercise is important for maintaining growth body and can contribute positively to maintaining a healthy weight, building and maintaining healthy bone density, muscle strength. Exercise has been shown to improve cognitive functioning via improvement of body's morphology and physiology, and enhancement of actively life. In addition, physical activity has been shown to be change anthropometric indexes. Our investigation in the Sport centre, SNU, showed that there are many modern instruments of sports indoor and outdoor. These are good conditions help students have for a practice everyday these modern instruments have not any universities in Vietnam now.

6. Conclusions

For the reality of anthropometry index of South Korean students: Basic morphological and physical indexes of students of South Korea are approximately equal to the average standard of the world's youth now and the Korean students have anthropometric indexes better than Vietnamese students. For example, the height of South Korean students averaging 174.51 cm (male) and 161.22 cm (female) while the height of Vietnamese students averaging 165.76 cm (male) and 155.22 cm (female).

Except for the influences of genetic, endocrine and race on effect to anthropometry index of South Korean students. The environment including many factors as Location, Geography, & Climate, regimen, Psychology, Physical exercise and so on are importance reasons as well which have influenced on students' health, and morphology and physical status of them.

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Ảnh hưởng của môi trường lên các chỉ số hình thái và thể lực của sinh viên Việt Nam và Hàn Quốc

Mai Văn Hưng, Sunyoung Pak

Đại học Quốc gia Seoul, Hàn Quốc

Nghiên cứu được thực hiện trên 916 sinh viên nam và 910 sinh viên nữ tuổi từ 20 đến 25 thuộc trường Đại học Tổng hợp Quốc gia Seoul, Hàn Quốc. Kết quả nghiên cứu cho thấy, các chỉ số nhân trắc cơ bản của sinh viên Hàn Quốc xấp xỉ mức trung bình của sinh viên thế giới và tốt hơn sinh viên Việt Nam. Ngoại trừ các nguyên nhân về gen, nội tiết và chủng tộc. Các yếu tố môi trường như điều kiện địa lý, khí hậu, dinh dưỡng, tâm lý xã hội, rèn luyện thân thể...cũng có vai trò vô cùng quan trọng ảnh hưởng đến các chỉ số nhân trắc này.