

ANTHROPOMETRIC PROFILE OF SELECTED STATE UNIVERSITY COLLEGIATE STUDENTS

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Abstract: Using the data obtained by Barlas (2003), this study determined and compared the mean difference on height, weight, sum of six skinfold (SUM6SKF); body mass index (BMI) and waist-to-hip ratio (WHR) of selected collegiate students who are in sports (VA) and those that are non-sports (NVA) to some previously established data. Seventy-two college students (36 male VA; 36 male NVA) were selected through simple random sampling. The VA were the 1st - 3rd college students while the NVA were the 1st - 2nd year students enrolled at one state university located in the southern part of the Philippines. The measurements included height, weight and six skinfold sites while BMI (weight in kg/ height in meter squared) and WHR (waist circumference/ hip circumference) were computed from the measurements generated. Mean and standard deviation of all data were computed while t-test was used to determine significant differences between groups. Results showed that while VA were relatively taller and heavier, no significant differences were found on all anthropometric variables between groups. However, when treated individually a significant difference existed on the measurements of their triceps, suprailiac and mid-thigh. No significant difference was established on their BMI and WHR.

Tóm tắt: Sử dụng dữ liệu thu được bởi Barlas (2003), nghiên cứu này đã xác định và so sánh sự khác biệt trung bình về chiều cao, cân nặng, 6 vị trí dưới da (SUM6SKF); chỉ số khối cơ thể (BMI) và tỷ lệ vòng eo/ hông (WHR) của các sinh viên đại học được lựa chọn đang chơi thể thao (VA) và những người không chơi thể thao (NVA) với một số dữ liệu được thiết lập trước đó. Bảy mươi hai sinh viên đại học (36 nam (VA); 36 nam (NVA)) đã được chọn thông qua lấy mẫu ngẫu nhiên đơn giản. VA là những sinh viên đại học năm thứ 1 - 3 trong khi NVA là sinh viên năm thứ 1 - 2 theo học tại một trường đại học của bang ở phía nam Philippines. Các phép đo bao gồm chiều cao, cân nặng và 6 vị trí dưới da để tính ra chỉ số BMI (cân nặng /chiều cao) và WHR (chu vi vòng eo/ hông) được tính từ các phép đo đã có. Giá trị trung bình và độ lệch chuẩn của tất cả dữ liệu được tính toán trong khi giá trị t được sử dụng để xác định sự khác biệt đáng kể giữa các nhóm. Kết quả cho thấy, trong khi VA tương đối cao và nặng hơn, không có sự khác biệt đáng kể được tìm thấy trên tất cả các biến nhân trắc học giữa các nhóm. Tuy nhiên, khi được kiểm tra riêng lẻ ở các bộ phận, đã có sự khác biệt đáng kể tại cơ tam đầu, cơ liên sườn và cơ giữa đùi của họ. Không có sự khác biệt đáng kể được thiết lập trên BMI và WHR của đối tượng nghiên cứu.

Keywords: anthropometry, PE students, state university collegiate students, varsity athletes.

Từ khóa: Nhân trắc học, sinh viên giáo dục thể chất, sinh viên đại học tiểu bang, vận động viên đội tuyển trường.

Introduction

Anthropometry is defined as the measurement of size and proportion, including skinfold thicknesses, circumferences, body widths and lengths, stature and body weights (Heyward & Stolarczyk, 1996; Heyward, 2006). Anthropometric measurements had been useful in monitoring growth and maturation in children and adolescents (Heyward, 2006), assessing changes in body composition associated with aging and malnutrition, as well as onset of risk factors and certain diseases (Heyward, 2006; WHO report 1998, 2008); and assessing training effects and performance elite athletes (Anap, et.al, 2014; Arazi, Mirza & Nobari, 2015).

The human body is considered a perfect work of art for its symmetry and proportions. It can perform innumerable tasks ranging from the lightest to the vigorous and from the graceful to the totally muscular. This ability of the human body to accomplish various activities however is affected by such factors as age, height, weight, body composition, nutrition and kinaesthetic involvement. Specifically, anthropometric measurements have been very helpful in acquiring information and understanding one's attribute in relation to sports performance. In athletes for instance, it correlates with performance and may likewise indicate conditions and potentials of athletes and can guide the students in choosing the sport or event which he or she is likely to succeed based on his innate anthropometric attributes.

Anthropometric studies had been intensive abroad and most of which focus on elite athletes' characteristics in relation to sports performance. Several studies determined the anthropometric characteristics, body shapes and athletic

performance of national level players (Carter and Honey 1990; Anap et al, 2014; Arazi, Mirza & Nobari, 2015, Pieter, et al., 1998; Pieter et al, 2006). A number of Filipino researches were also conducted that deeply focused on elite athletes. A study on the body build of female Filipino artistic gymnasts was conducted earlier by Bercades and his colleagues (1999). Separately, an investigation on the somatotypes, fat patterning and anthropometry of elite Filipino combative sports athletes were also investigated (Pieter, et al., 1998; Pieter et al, 2006). At present, only a few data were available that looked into the lower level sports echelon participants, specifically on collegiate athletes. To mention, fitness profile of Filipino collegiate varsity athletes coming from private universities were studied by Bercades and colleagues (2004). Kim et al (2014) investigated the performance characteristics of Filipino collegiate athletes coming from the private university in Pasig City, Philippines and found out that male ($1.70 \pm .07$) were taller than female ($1.58 \pm .07$). In terms of weight, similar results were arrived with male (67.84) being heavier than female (54.83 ± 8.87). Kim, Cruz & Kim (2013) studied the anthropometric profiles of Filipino collegiate badminton athletes revealing that male badminton athletes have the following characteristics: mean age = 18.43 ± 1.996 ; height = 168.19 ± 6.626 ; weight = 66.24 ± 9.109 ; BMI = 23.34 ± 2.196 ; WHR = $.84 \pm .037$.

Anthropometric studies focused on college students particularly on those that are not in sports and its characteristics are limited and if there are some, it focused on private university athletes with only a few were conducted involving state universities. Few local available studies at the moment deeply focused on collegiate students' anthropometry, particularly

in the regional level were available; hence, this study is purported. Since a number of these collegiate student-athletes can serve as home-grown backyard talent for higher sports competition, there is a need to look at these innate possible characteristics. This study is conducted so as to establish data on state university collegiate students' anthropometric characteristics in Iloilo City, Philippines.

Methodology

Participants

The 72 participants were composed of male VA ($n = 36$; age range = 17-19 years old; mean age = $17.97 \pm .736$) and NVA ($n = 36$; age range = 17-20 years old; mean age = $17.92 \pm .802$) selected through simple random sampling. Among the VA, 8 were from basketball, 10 were soccer, six from volleyball, three from taekwondo, six from baseball and three coming from swimming. The selected VA were the 1st years to 3rd year college students that have trained for at least 2-3 times per week for 1-2 hours per training sessions for the past three months. On the other hand, the NVA were the first and second year college students enrolled and attending regular basic Physical Education classes once per week for at least 2 hours per session. All were enrolled in the same university.

Since the measurements required the subjects to wear minimal clothing making them expose their salient parts, and for the purposes of ethical considerations, an informed consent was given to them prior to the actual measurement. Moreover, since some of them were below 18 years old, a parent informed consent was secured. Measurements were taken between 7:00 - 9:00 am to ensure subjects hydration in a well-ventilated room. Prior to the measurements, the purposes of the study were

personally explained by the researcher and their participation was emphasized to be purely voluntary.

Anthropometric measurements

Measurements made included the following: *height* - using a butterfly flexible tape permanently mounted on the wall and a roca board; *weight* - using a Detecto weighing scale calibrated in true zero; *sum of six skinfolds* (triceps, subscapular, abdominal, mid-thigh & medial calf) using a Slimguide skinfold caliper; and two *girths* (waist and hip) using a Gullick anthropometric tape.

All anthropometric measurement protocols were followed from the Anthropometric Standardization Manual (Lohman, Roche and Martorell, 1988). Measurements were taken by the researcher with his trained assistants recording the announced readings in the proforma data sheet. All measurements were taken three times and the median was used for statistical treatment. With the exception of height, weight and girths, all measurements were taken at the right side of the body. BMI were then computed from the direct measurements of weight and height and similarly, WHR were determined from the measurements of waist and hip. Statistical analysis included mean and standard deviation for descriptive, while t-test set at .05 alpha level of significance for inferential using the SPSS 17.0 version

Results

Results in Table 1 showed in terms of height and weight, Although VAs were slightly taller and heavier than NVA, no significant difference was found. In terms of their SUM6SKF, as an entire group, no significant difference existed between groups. However, when treated individually, VAs had smaller triceps, suprailiac, and mid-thigh skinfold measurements than non-athletes. In terms of the

subjects BMI and WHR, results revealed that both VA and PES were comparable with each other with both groups possessing acceptable

and healthy values when referred to the WHO standards (WHO report, 1988; WHO report 2008).

Table 1. VAs & NVAs height, weight, SUM6SKF, BMI and WHR

Variable	M	SD	t-value	p
<i>Height</i>				
VA	1.67	6.24	.916	.363
NVA	1.66	6.11		
<i>Weight</i>				
VA	58.33	7.27	.709	.481
NVA	56.89	9.83		
<i>Triceps</i>				
VA	7.14	2.69	2.735*	.008
NVA	9.69	4.92		
<i>Subscapular</i>				
VA	10.61	4.58	.772	.443
NVA	56.89	9.83		
<i>Supra-iliac</i>				
VA	12.39	6.09	1.992*	0.50
NVA	16.28	10.01		
<i>Abdominals</i>				
VA	12.94	6.85	1.095	.277
NVA	14.69	6.71		
<i>Mid-thigh</i>				
VA	10.72	5.15	2.315*	.024
NVA	14.31	7.73		

<i>Calf</i>				
VA	6.47	2.76	9.918	.059
NVA	8.33	5.13		
<i>SUM6SKF</i>				
VA	60.28	24.9	1.970	.053
NVA	74.72	36.27		
<i>BMI</i>				
VA	20.68	3.25	.194	.847
NVA	20.81	2.23		
<i>WHR</i>				
VA	.784	.04	1.680	.097
NVA	.798	.03		

Furthermore, when the results of the present investigation were compared to data established by Pieter et al (2006) on Filipino combative athletes, the participants of the present study though were younger, yet were shorter and lighter than the combative athletes. As to their SUM6SKF, the combative athletes have better measurements as compared to the present subjects. Similarly, when it was compared to

that of Kim and colleagues (2013), it showed that the present subjects were younger, comparable in height and were lighter than the badminton athletes. In terms of BMI and WHR, though the badminton athletes have higher mean values as compared with the present study, yet, their attained mean BMI and WHR were healthy and normal (Table 2).

Table 2. Comparison on the age, height, weight, SUM6SKF, BMI and WHR between the present study and that of Pieter et al and Kim et al

<i>Categories</i>	<i>Present study</i>	<i>Pieter et al</i>		<i>Kim et al</i>
	PES (n = 72)	Pencak Silat (n = 8)	Karate (n = 12)	(n = 23)
Age	17.95 ± .77	24.4 ± 4.8	24.0 ± 4.8	18.43 ± 1.996
Height	1.67 ± 6.18	1.68 ± .05	1.70 ± .05	1.68 ± 6.626
Weight	57.61 ± 8.55	63.2 ± 9.1	64.3 ± 7.1	66.24 ± 9.109

SUM6SKF	67.5 ± 30.59	53.7 ± 24.2	48.1 ± 15.7	(7 sites were used)
BMI	20.74 ± 2.74	Not in the study		23.34 ± 2.196
WHR	0.79 ± 0.04	Not in the study		0.84 ± 0.037

Conclusion

The results of heights of the VA and NVS showed that they can be comparable with each other. Perhaps, it can be said that age cannot influence height since physical and skeletal maturity is gradually tapering and growth spurts ceases. In terms of their weights, both groups are comparable with each other. The VA and NVA present age range is the period in one's life where musculature starts to mature and fat patterning and deposition is not prominent. It can also be said that the younger the person the lesser his adiposity and as the older the person becomes, the higher the relative body fat resulting one to become heavy. As to the VA and NVA BMI and WHR, both are considered healthy. Result of the study also implied that in terms of monitoring training effect, the SUM6SKF is the most effective method to differentiate individually as to training

adaptation and performance. Comparison of the present participants to the previously established data showed, that in terms of height they are comparable with each other. Perhaps, this suggests that the present established data on height is the standard among Filipino males since the compared samples were from different regions of the Philippines, yet heights were almost identical. It can also be said that the students from private university were heavier than the students from state university. This difference in weight is seen to have influenced their mean BMI and WHR between the subjects

Finally, SUM6SKF comparison showed that skinfold measurement is the best method that can objectively differentiate individual particularly in monitoring training effect considering frequency, intensity, time, and exercise modalities.

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