

ANTHROPOMETRIC MEASUREMENTS AND THEIR RELATIONSHIP WITH THE PRACTICAL TESTS OF THE SWIMMING COURSE AMONG PHYSICAL EDUCATION STUDENTS AT BIRZEIT UNIVERSITY

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Abstract

The study aims to identify the anthropometric measurements and their relation with the practical tests of the swimming course among physical education students at Birzeit University, to achieve this the study was conducted on a sample of (42) students of specialization, and the following anthropometric measurements were made on them: length, weight age and body mass index.

Results of the study showed that the mentioned anthropometric measurements and their practical test of swimming course among physical education students. The results also showed that there are no statistical differences on the evidence level ($\alpha \leq 0.05$) between anthropometric variances' and some tests of the swimming course due to sex.

The researchers recommended to put into consideration the Anthropometric measurements, when accepting new students in the physical education specialization in the university, and make other studies on other courses rather than swimming course and other sphere rather than the water sphere.

Key Words: Anthropometric Measurements, Swimming, Physical Education.

Introduction:

Anthropometric measurements are very important in physical education, because they provide the athletes with the distinctiveness, and prevalence. They are also increase the chance to absorb more

athlete's skills and techniques, in performing the physical activities. They become the main pillar in choosing the athletes, and directing them to other kinds of sports that suits their ability, (2). The anthropometric

measurements have a special importance, because they provide the chance to absorb more correct movement performance. The body measurements are developed together with the development of both sciences, to become comprehensive that consist of different measurements and length, various specialists and researchers have tackled the anthropometric measurements in their studies, (12) has implemented a study about the anthropometric measurements, physical and accuracy in the basketball.

The study sample consists of 52 students of physical education specialization in An-Najah University. The study concluded that the intramuscularly ability is the most effective in accurate shooting.

The best relationship is between the accurate shooting from fixity point and the length of the peak that reaches (0.70), while the best relation between accurate shooting from moveable status is with the length of palm that reaches (0.54). In Kadumi study and others (13), which aimed to recognize the contribution of body mass index and anthropometric measurements in the distance of the seam of fixity and movement point within football athletes. The study was implemented on a sample of 31 football athletes in An-Najah University, the body mass index and anthropometric measurements have been taken. Results showed that the best relationship in body mass index and anthropometric measurements is between the strength of the two legs with the distance of the seam thrown from stability and movement, while in the anthropometric measurements, the best relationship was between the length and the distance of the seam thrown from

stability, the best relationship was between body mass index and the distance of the seam from movement.

It is worth mentioning that the sports activities require their own physical specifications, in order to reach the highest level, the body must be suitable for the type of sport activity practice. Physical measurements are of great importance in assessing the individual's growth and identifying the individual differences between them through the knowledge of weight and length in the various stages of life, and the physical self of the individual has high relationship in many vital areas, physical growth is also related to health and compatibility.

Nikituk(1989) shows the importance of knowledge and study of physical and anthropometric measurements by athletes. Each sport activity has its own requirements, which distinguish it from other activities. These requirements are reflected in the characteristics that must be provided by the person performing the activity.

Hence, the current study attempts to identify anthropometric measurements and their relationship to the practical tests of the swimming course among students of physical education at Birzeit University

Methods:

This section is devoted to specifying the steps and the methodology used in carrying out the research endeavor. This chapter discusses research design, study population and sample, instrument and its validity and reliability, data collection procedures, and the statistical analysis.

Study Design:

This study uses a cross-sectional design, based on swimming tests results. The study design involves observation of a representative sample of Physical Education students at Birzeit University. It employs descriptive and inferential design. The primary goal is to try to provide as comprehensive description as possible, whereas the cross sectional is focused on individuals at fixed events during life.

Population & Sample of the Study:

This study was conducted on Physical Education students enrolled in swimming course at Birzeit University to measure Anthropometric measurements and their relationship with the practical tests of the swimming course among Physical Education students at Birzeit University. The study sample consists of (42) physical education students enrolled in swimming at course Birzeit University.

It was approved by the department. This was done since we are a newly established department, and we do not have an ethics committee yet. Researcher has acquired verbal consent from the participants to take part in his study, who are students in the swimming course that he teaches.

The following table shows the numbers and distribution of the study sample. A representative stratified sample of (n=42) was selected.

Table 1. Shows the distribution of the study population according gender.

Variable	lever	Frequency	%
Gender	Male	30	71.4
	Female	12	28.6
	Total	42	100.0

Instrumentation:

After conducting an extensive literature review on a Anthropometric measurements and their relationship with the practical tests of the swimming course among Physical Education students at Birzeit University, data was collected via a structured questionnaire developed in English language which consisted of (18) items in three parts, organized to measure Anthropometric

measurements and their relationship with the practical tests of the swimming course among Physical Education students at Birzeit University

A- First: it informed the respondent of the objectives and the importance of the study and assured them that the data collected was for scientific purposes only.

B- The Second: it collected demographic information.

C- The third: this was devised to collect information on Anthropometric measurements and their relationship with the practical tests of the swimming course among Physical Education students at Birzeit University.

- Test instruments (measuring tape, stopwatch, weight scale, recording cards, and whistle).

- Practical tests for swimming course:

1. Test the ability to slide on the chest. (Meter)

2. Test the ability to slide back. (Meter)

3. Test the ability to mute the breathing of buoyancy mode. (A second)

4. Test the ability to stand in deep water. (Sec)

5. Test the initial 15-meter backstroke only two men. (A second)

6. A primary (15m) swimming test with two arms and two legs together. (A second)

- Anthropometric measures include: (height, weight, age, BMI)

Practical tests for the swimming course used by the researchers according to the opinions of experts and specialists:

* Test the ability to slide the chest:

- Purpose of the test: To know the ability of students (learners) to perform the slide on the chest as long as possible.

- Test conditions: The test begins inside the water by pushing the wall of the bathroom feet and slide on the chest keeping the body in the horizontal position for the longest possible distance.

- Tools used: tape measure, records, pens.

- Test Recording: The test is recorded for the learner who performs the slide in the right way, by the laboratory

Measuring the distance traveled by the learner and is the last point reached since the push to the wall with feet to stop it from slipping.

* Test the ability to slide on the back:

- Purpose of the test: To know the ability of students (learners) to perform the slide on the back as long as possible.

- Test conditions: The test begins inside the water by pushing the wall of the bathroom feet and slide on the back and retain the body for the longest possible distance.

- Tools used: tape measure, records, pens.

- Test Recording: The test is recorded for the learner who performs the slide in the right way, by the laboratory

Measuring the distance traveled by the learner and is the last point reached since the push to the wall with feet to stop it from slipping.

* Test the ability to mute the breathing mode of float buoyancy:

- Purpose of the test: To know the ability of students (learners) to mute the breath for as long as possible.

- Test conditions: The test begins in the water where the learner to float with the mute self-mutilation for as long as possible.

- Tools used: stopwatch, registration papers, pens.

- Recording the test: The measurement of time begins since the student or student immerses himself until the moment he is out of the water and records the time in seconds.

* Test the ability to stand in deep water:

- The purpose of the test: to know the ability of students or learners to stand in the deep water for as long as possible.

- Test conditions: In the deep part of the pool the player begins to stand in the water

and keep this situation until the moment stopped on the traffic stand.

- Tools used: stopwatch, registration forms, pens.

- Test Recording: The test time starts from the start to the moment the student or learner stops performing.

- * Swimming test 15 meters on an initial back only two men:

- The purpose of the test: To know the ability of students or learners to perform the movements of the two men to swim back (primary) for 15 meters in the shortest possible time.

- Test conditions: The learner or students begin testing inside the water from standing position and arms high by pushing

The swimming pool wall with feet and the movements of the two legs as in the initial back swimming (movement of the flop) for a distance of 15 meters.

- Tools used: stopwatch, registration papers, pens.

- Recording of the test: The test is recorded for the individual who performs the movements of the two men for the initial back swimming (movement of the rib) in the right way for a distance of 15 m and the time is measured in the second.

- * Swimming test (15) meters on the back Initial two arms and two men together:

- The purpose of the test: to know the ability of students or learners to travel a distance of (15) meters in the shortest possible time.

- Test conditions: The learner or students begin testing inside the water from standing position and arms high by pushing the wall of the swimming pool feet and the movements of the arms and legs for a distance of (15) meters.

- Tools used: stopwatch, registration papers, pens.

- Test recording: The test is recorded for the individual who performs the movements of the arms and legs (movement of the rib) in the right way to a distance of 15 m and measured time in a second.

Study Questions:

The study main question is: Is there a statistically significant relationship at the level of significance (0.05α) between anthropometric measurements of variables and swimming tests in swimming course among physical education students at Birzeit University?

To answer the main question, the following sub-questions are raised:

1. What is the relationship between the anthropometric measurements (height, weight, age, BMI) and swimming tests in swimming course among male physical education students at Birzeit University?
2. What is the relationship between the anthropometric measurements (height, weight, age, BMI) and swimming tests in swimming course among female physical education students at Birzeit University?
3. 1. What is the relationship between the anthropometric measurements (height, weight, age, BMI) and swimming tests in swimming course among male and female physical education students at Birzeit University?

Reliability of the Instrument:

To determine the reliability of three sub-questionnaires, alpha formula was used as in table (2).

Table 2. Alpha formula of instrument reliability.

Descriptive Statistics			
	N	Mean	Std. Deviation
Height	42	1.7114	.07782
weight	42	67.1190	11.18405
age	42	20.4286	1.39935
BMI	42	22.8161	2.78261
sliding on the chest in meters	42	6.2952	1.38250
siding on the back in meters	42	5.2071	1.25341
breath holding in position in seconds	42	27.2836	16.67084
standing in water in seconds	42	11.6686	11.09507
leg movement in back sliding for 15 meters in seconds	42	30.4762	11.93786
back sliding for 15 meters in seconds	42	23.9314	9.58893
Valid N (listwise)	42		

The results of table (2) show that the ranges of reliability w (0.90), these values are suitable for conducting such a study.

Validity of the Instrument:

The questionnaire was reviewed by a group of experts in the field of scientific research. They deleted and rephrased some items until the study instrument reached its final form.

Statistical Analysis:

The Statistical package for social science (SPSS) version 17 was used for data analysis. Various statistical tests and procedures were used including (means, frequencies, standard deviation, cross-tabulation, t-test for independent samples, ANOVA, post hoc Scheffe's test). P-value of less than or equal to 0.05 was used to test the significance in testing the study hypothesis.

Ethical Issues: this study is conducted on human subjects, and to assure that the ethical issues are taken into consideration, permission to conduct this study was obtained. In addition, respondents were informed about the purpose of the study before the interview and were told that their participation was voluntary, and any information obtained would be confidential and would be used for scientific research purposes only.

Results:

The Results will be presented in two parts. The first part deals with the descriptive analysis of Anthropometric measurements and their relationship with the practical tests of the swimming course among Physical Education students at Birzeit University.

The second part is dedicated to test study hypothesis, and to discuss the role of the variables in Anthropometric measurements and their relationship with the practical tests of the swimming course among Physical Education students at Birzeit University.

Results related to the first part

The first question was:

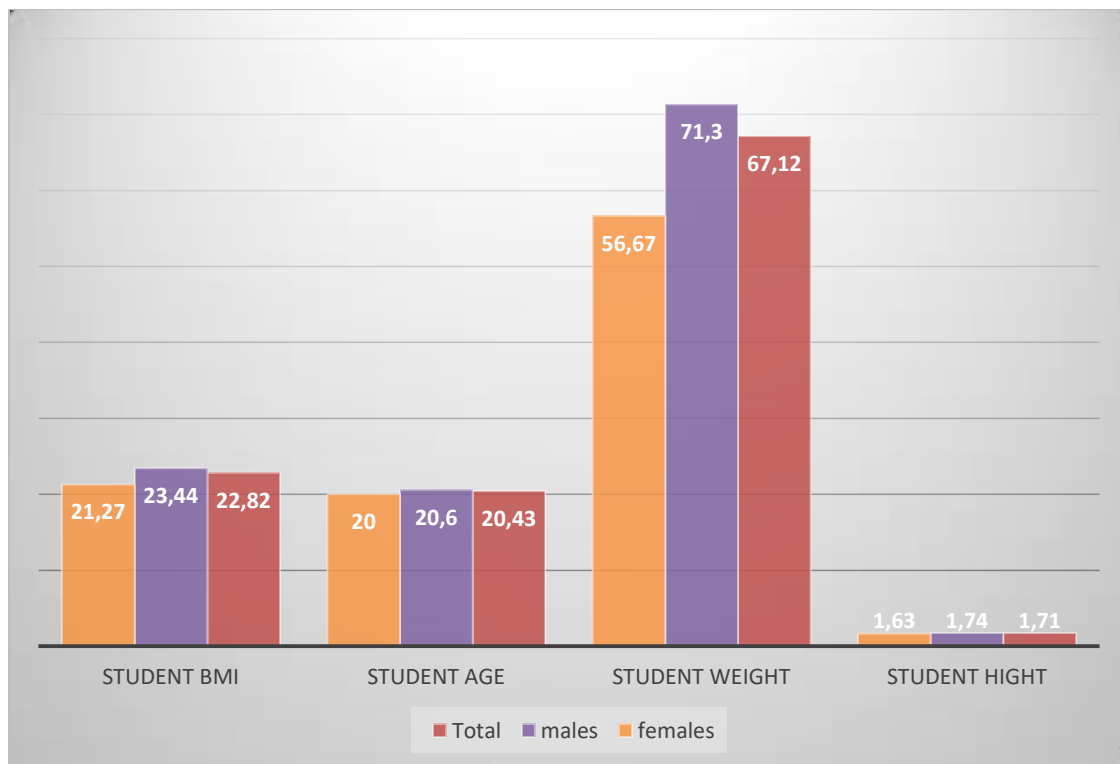
What is relationship between Anthropometric measurements and swimming course tests among Physical Education students at Birzeit University?

To answer the study questions; mean, standard deviation of Anthropometric measurements of swimming course tests among Physical Education students at Birzeit University is computed:

Table 3. Mean, standard deviation for total score of Anthropometric measurements among Physical Education students at Birzeit University.

		Total		males		females	
	N	Mean	Std. Deviation	Mean	Std. Deviation	Mean	Std. Deviation
Student Height	42	1.71	.08	1.74	.06	1.63	.07
Student weight	42	67.12	11.18	71.30	9.07	56.67	9.08
Student age	42	20.43	1.40	20.60	1.63	20.00	.00

Student BMI	42	22.82	2.78	23.44	2.37	21.27	3.23
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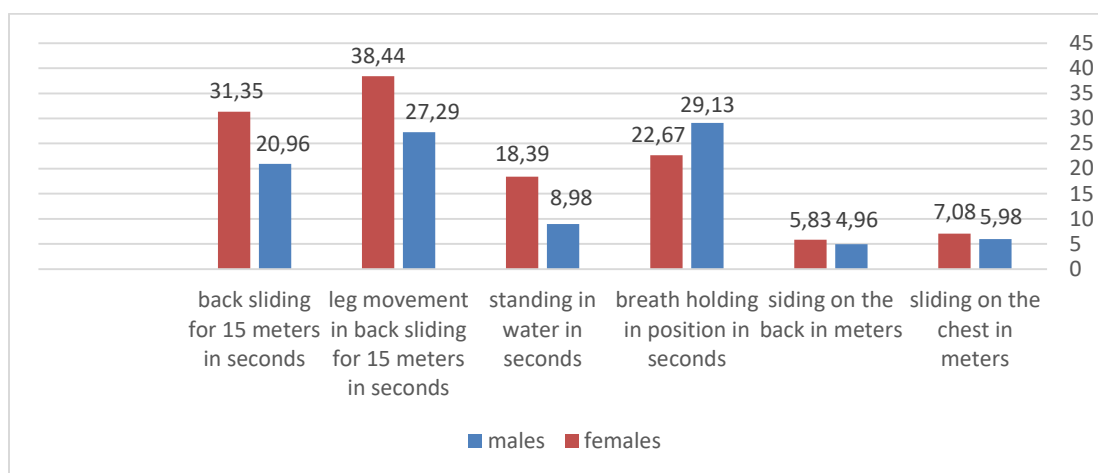


Results indicates that Height mean for the study sample was higher for male students compared to female students with a total average of (1.71) m. results indicates that males are Heavier than females in general with an average weight of (71.3) kg.

Table 4.Mean, standard deviation for total score of swimming course tests among Physical Education students at Birzeit University.

	N	Total		males		females	
		Mean	Std. Deviation	Mean	Std. Deviation	Mean	Std. Deviation
sliding on the chest in meters	42	6.30	1.38	5.98	1.34	7.08	1.20
siding on the back in meters	42	5.21	1.25	4.96	1.21	5.83	1.17
breath holding in position in seconds	42	27.28	16.67	29.13	18.88	22.67	7.98
standing in water in seconds	42	11.67	11.10	8.98	6.65	18.39	16.54

leg movement in back sliding for 15 meters in seconds	42	30.48	11.94	27.29	10.43	38.44	12.14
back sliding for 15 meters in seconds	42	23.93	9.59	20.96	7.22	31.35	11.00



Results indicates that results of chest sliding in meters was generally higher for female students compared to male students, females achieved longer chest sliding distance with an average of (7.08m). The same results are for back sliding were females achieved (5.83m) compared to males who achieved (4.96m).

The results also indicate that male students managed to achieve longer breath holding time with an average of (29.13 s) compared to females who achieved (22.67). Female students on the other hand, managed to

achieve longer water standing time with an average of (13.35s) compared to males who achieved (8.98s).

In Test results of leg movement in back sliding for 15 meters in seconds females took longer with an average of (38.44s) compared to males who achieved shorter time with an average of (27.29s). moreover, Test results of back sliding for 15 meters in seconds indicates that females took longer with an average of (31.35s) compared to males who achieved shorter time with an average of (20.96s).

Table 5. Correlation matrix between Anthropometric measurements (Height, weight, age, BMI) and swimming course tests among Physical Education students at Birzeit University

		Height	weight	age	BMI
sliding on the chest in meters	Pearson Correlation	-.035-	.209	-.020-	.279
	Sig. (2-tailed)	.825	.184	.898	.073
siding on the back in meters	Pearson Correlation	-.009-	-.112-	-.124-	-.169-
	Sig. (2-tailed)	.957	.480	.433	.283
breath holding in position	Pearson Correlation	-.032-	.149	.045	.233

in seconds	Sig. (2-tailed)	.839	.347	.776	.137
standing in water in seconds	Pearson Correlation	-.161-	-.141-	-.137-	-.096-
	Sig. (2-tailed)	.308	.373	.386	.545
leg movement in back sliding for 15 meters in seconds	Pearson Correlation	-.330 [*]	-.364 [*]	.020	-.268-
	Sig. (2-tailed)	.033	.018	.902	.086
back sliding for 15 meters in seconds	Pearson Correlation	-.298-	-.323 [*]	.027	-.247-
	Sig. (2-tailed)	.055	.037	.865	.115

Study results indicate that the two variables of (leg movement in back sliding for 15 meters in seconds) and (Height) were correlated, $r(42) = 0.33$, $p < 0.03$.

Study results indicate that the two variables of (leg movement in back sliding for 15 meters in seconds) and (weight) were correlated, $r(42) = 0.36$, $p < 0.01$.

Study results indicate that the two variables of (back sliding for 15 meters in seconds) and (Height) were correlated, $r(42) = 0.29$, $p < 0.05$.

Study results indicate that the two variables of (back sliding for 15 meters in seconds) and (weight) were correlated, $r(42) = 0.32$, $p < 0.03$.

Table 6. Correlation matrix between Anthropometric measurements (Height, weight, age, BMI) and swimming course tests among male Physical Education students at Birzeit University

gender		Height	weight	age	BMI
sliding on the chest in meters	Pearson Correlation	.463 ^{**}	.609 ^{**}	.064	.430 [*]
	Sig. (2-tailed)	.010	.000	.737	.018
	N	30	30	30	30
siding on the back in meters	Pearson Correlation	.436 [*]	.198	-	-
	Sig. (2-tailed)	.016	.294	.686	.779
	N	30	30	30	30
breath holding in position in seconds	Pearson Correlation	-.237-	.034	.011	.198
	Sig. (2-tailed)	.207	.857	.953	.294
	N	30	30	30	30
standing in water in seconds	Pearson Correlation	.319	.241	-	.074
	Sig. (2-tailed)	.085	.199	.514	.697
	N	30	30	30	30

leg movement in back sliding for 15 meters in seconds	Pearson Correlation	-.148-	-.122-	.143	-.044-
	Sig. (2-tailed)	.435	.520	.449	.819
	N	30	30	30	30
back sliding for 15 meters in seconds	Pearson Correlation	.041	.034	.200	.021
	Sig. (2-tailed)	.830	.859	.289	.911
	N	30	30	30	30

Study results indicate that the two variables of (sliding on the chest in meters) and (Height) were correlated among male students, $r(30) = 0.46, p < 0.01$. Study results indicate that the two variables of (sliding on the chest in meters) and (weight) were correlated among male students, $r(30) = 0.60, p < 0.01$. Study results indicate that

the two variables of (sliding on the chest in meters) and (BMI) were correlated among male students, $r(30) = 0.43, p < 0.01$. Study results indicate that the two variables of (sliding on the back in meters) and (Height) were correlated among male students, $r(30) = 0.43, p < 0.01$.

Table 7. Correlation matrix between Anthropometric measurements (Height, weight, age, BMI) and swimming course tests among female Physical Education students at Birzeit University

sliding on the chest in meters	Pearson Correlation	-.163-	.469	. ^c	.585*
	Sig. (2-tailed)	.613	.124	.	.046
	N	12	12	12	12
sliding on the back in meters	Pearson Correlation	-.100-	.151-	. ^c	-.084-
	Sig. (2-tailed)	.758	.640	.	.795
	N	12	12	12	12
breath holding in position in seconds	Pearson Correlation	-.066-	.197	. ^c	.234
	Sig. (2-tailed)	.840	.540	.	.463
	N	12	12	12	12
standing in water in seconds	Pearson Correlation	-.028-	.024	. ^c	.033
	Sig. (2-tailed)	.931	.940	.	.920
	N	12	12	12	12
leg movement in back sliding for 15 meters in seconds	Pearson Correlation	.063	.215-	. ^c	-.295-
	Sig. (2-tailed)	.845	.503	.	.352

	N	12	12	12	12
back sliding for 15 meters in seconds	Pearson Correlation	.028	.163-	.c	.224-
	Sig. (2-tailed)	.930	.612	.	.484
	N	12	12	12	12

Results of the first hypothesis:

There are no statistically significant differences in means that at p value = 0.05) in Anthropometric measurements (Height, weight, age, BMI) and swimming course tests among Physical Education students at Birzeit University due to gender.

An independent-samples t-test was computed to compare Anthropometric measurements (Height, weight, age, BMI) and swimming course tests among Physical Education students at Birzeit University due to gender in females and male participants.

Table (8): An independent-samples t-test was conducted to compare Anthropometric measurements (Height, weight, age, BMI) and swimming course tests among Physical Education students at Birzeit University due to gender in females and male participants.

	gender	N	Mean	Std. Deviation	t	sig
Hight	male	30	1.7430	.05742	5.398	.000
	female	12	1.6325	.06608		
weight	male	30	71.3000	9.07117	4.722	.000
	female	12	56.6667	9.07878		
age	male	30	20.6000	1.63158	1.264	.213
	female	12	20.0000	.00000		
BMI	male	30	23.4350	2.36692	2.409	.021
	female	12	21.2687	3.23009		
sliding on the chest in meters	male	30	5.9800	1.33924	-2.479-	.017
	female	12	7.0833	1.20290		
siding on the back in meters	male	30	4.9567	1.21284	-2.135-	.039
	female	12	5.8333	1.17422		
breath holding in position in seconds	male	30	29.1303	18.87876	1.139	.261

	female	12	22.6667	7.98104		
standing in water in seconds	male	30	8.9820	6.64576	-2.658-	.011
	female	12	18.3850	16.53770		
leg movement in back sliding for 15 meters in seconds	male	30	27.2890	10.43129	-2.989-	.005
	female	12	38.4442	12.13882		
back sliding for 15 meters in seconds	male	30	20.9630	7.22238	-3.607-	.001
	female	12	31.3525	11.00378		

“There was a significant difference in the scores for sliding on the chest in meters in males ($M=5.98$, $SD=1.33924$) and female results ($M=7.0833$, $SD=1.20$) conditions; $t(41)=2.47$, $p=0.017$ ”

“There was a significant difference in the scores for sliding on the back in meters in males ($M=4.9$) and female results ($M=5.8$) conditions; $t(41)=2.1$, $p=0.03$ ”

“There was a significant difference in the scores for standing in water in seconds in males ($M=8.9$) and female results ($M=18.3$) conditions; $t(41)=2.6$, $p=0.01$ ”

“There was a significant difference in the scores for leg movement in back sliding for 15 meters in seconds in males ($M=27.2$) and female results ($M=38.4$) conditions; $t(41)=2.9$, $p=0.005$ ”

“There was a significant difference in the scores for back sliding for 15 meters in seconds in males ($M=20.9$) and female results ($M=31.3$) conditions; $t(41)=3.6$, $p=0.01$ ”

DISCUSSION

In order to answer the main question: What is relationship between anthropometric measurements and swimming course tests among physical education students at Birzeit University? Appropriate statistical analysis was used.

Tables (3) and (4) indicated that the anthropometric measurements (height, weight, age, BMI) had a strong relationship with the practical tests of the swimming course of the students. With a total average of 1.71 meters. The results indicate that males are heavier than females in general with an average weight (71.3) kg.

The results of chest sliding in meters were generally higher for female students compared to male students, and females had a longer slippage on the chest at an average of 7.08 m. The results were the same as for the back slippage, where females achieved (5.83 meters) compared to males who achieved (4.96 meters). In the view of the researchers that low weight in females may be the cause.

The results also show that male students were able to achieve a longer respiration time in seconds (29.13 seconds) than female students (22.67 seconds). On the other hand, female students were able to achieve a longer period of water (18.39) compared to male students who achieved (8.98) seconds. The researchers found that male students were better at mute self than the condition may be due to the large size of the lungs and rib cage compared to female students. Female students are better at standing in water because of their mass. In the results of the 15-meter back-slip test, females took a longer time (38.44 seconds) than males who achieved a shorter time (27.29 seconds). Furthermore it, the results of the 15-meter back-slip test show that females took longer (31.35) than men who achieved a shorter time (20.96 seconds). The researchers believe that the reason may be due to increased strength and muscle mass in comparison to the students and nothing else.

It is clear from anthropometric measurements (length, age, and body mass index) the existence of a strong relation between tests results of the swimming course among the physical education student's specialization, accordingly the researchers recommended the followings:

To put into consideration the anthropometric measurements when accepting new students in the physical education specialization. Implement other studies on other courses of physical education specialization other than swimming and other spheres other than water.

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Approval of the Department of Sports Education



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دائرة التربية الرياضية

To Whom It May Concern

The department of physical education at Birzeit University certifies that the research study titled "Anthropometric measurements and their relationship with the practical tests of the swimming course among Physical Education students at Birzeit University" conducted by Dr. Waleed Shahin was approved by the department. This was done since we are a newly established department, and we do not have an ethics committee yet. Dr. Waleed has acquired verbal consent from the participants to take part in his study, who are students in the swimming course that he teaches.

Head of Department

