Journal for Educators, Teachers and Trainers
The PROFESIOLab electronic, peer-reviewed, open-access Magazine

ISSN 1989-9572

DOI:10.47750/jett.2024.15.05.007

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Journal for Educators, Teachers and Trainers, Vol.15(5)

https://jett.labosfor.com/

Date of reception: 18 Sep 2024

Date of revision: 07 Oct 2024

Date of acceptance: 08 Nov 2024

Azzem Ahmed, Gasmi Abdelmalek, Sellami Abderrahim, Loukia Youcef, Elhachemi Elhadj Hammich (2024). Evolution of certain morphological characteristics of young Algerian volleyball players aged 15 to 17 years old. *Journal for Educators, Teachers and Trainers*, Vol.15(5).69-77.

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Evolution of certain morphological characteristics of young Algerian volleyball players aged 15 to 17 years old

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Abstract:
Objective: This research aims to follow the evolution of the morphological characteristics of young volleyball players aged 15-17 during a sporting season.
Methodology (12) young male volleyball players aged 15 to 17 participated in this present study, they are volleyball players licensed in the volleyball league of the wilaya of Mila and from the WRSM teams (WidadRiadhi Sidi-sghier Mila) ; EST (Entente Sportive Tadjenanet)
Our experimental protocol consisted of defining the morphological parameters of the sample studied by taking anthropometric measurements.
Results: Existence of a significant difference for the variables (Height), (Height Sitting, Upper Limb, Arm, Lower Limb, leg, Foot), (Forearm, Thigh), (Height Sitting, Upper Limb, Arm, front -arm, Lower limb, Thigh, Foot), (Leg), (Chest EXP/REST, Arm Rest/Stretched), (Biacrom, Elbow, Wrist), between the control phases (C01&C02), and the difference in favor control (C02).
On the other hand, for the variables (Weight), (hand), (INSP Chest, Stomach, Pelvis, Forearm, Thigh, Leg), diameter variables (Thorax, Bicretal, Knee, Ankle), body composition variables ((%) Fat Mass, (%) Lean Mass), there is no significant difference between the control phases (C01&C02).

Keywords: morphological characteristics, volleyball, U17 or 15-17 years old.

1.Introduction

The contribution of biological, morphological, biochemical, physiological, psychological, statistical and other sciences has become increasingly important, with a view to the methodological mastery of the preparation of athletes, as well as their detection, selection and orientation towards the disciplines where they should excel to reach the desired high level.
According to a summary of Top Volley 2002 drawn up by the FIVB concerning the trends of high level men, it was noted that the morphological aspect was very developed (the height of the players plays a very important role: 197.7 cm average height of the players at the Sydney 2000 Olympics) and this average height was 196.2 cm among the young volleyball players participating in the under-19 world championships which took place in Algeria in 2005 (Lammari.F et col, 2007).
(Ivoilov.A.V, 1984) confirmed that among volleyball players the height being larger, the legs are longer (94cm on average) in comparison with other sports (75.3 on average). The volleyball player's body weight is also smaller in relation to his height.

Adolescence is a period characterized by multiple biological transformations which function to bring the body to full maturity. This period allows you to develop physical fitness and coordination skills (technique) simultaneously with maximum intensity. (J. Weineck, 2001).

A study by N.J. Bulgakova (1978) emphasizes the importance of morphological and functional models; This study carried out on high-level swimmers made it possible to develop morphological and functional models. Functional models make it possible to identify the main training objectives; Morphological models make it possible to assess the adequacy between the morphological characteristics of a swimmer and the discipline he has chosen. (V. Platonov, 1984).

Many studies (Billat V., 2006; Schurch.P. 1984; Thollet.J. 2006) agree that anthropometric parameters play an important role in sporting success, and that tall height conditions the value of basketball players, volleyball players or handball players.

The field of anthropometry is widely exploited by a large number of authors; (Martinez et al. 1993; Lucia et al. 2001; Padilla et al. 2004 and Pussieldi et al. 2010)

According to (Schurch, 1984); Morphological criteria represent the first level of determining factors of performance. They are often considered basic factors for any sports selection.

According to (Boulgakova,1978) who states that anthropometric data such as height, body mass, segmental ratios and body surface area are often essential factors for the practice of certain sports and constitute an essential tool for the coach.

In their study of West Australian volleyball players, Ongley and Hopley (1981) showed that volleyball performance is strictly proportional to the size and muscular capabilities of the players. The study of body proportions in athletes in relation to the specialty makes it possible to establish characteristic features of the body constitution, which can contribute to achieving high sporting results.

Anthropometric research applied to sports is relatively numerous. Of a descriptive nature, this type of study aims rather to establish morphological profiles by sporting specialty and this, most often, in association with physiological characteristics (VO2max for example) in a perspective athlete evaluation. (Cazorla, 1984) (Quoted by A.B.Dufour, science and motor skills n° 2 – 1987).

In Algeria, several studies have been carried out on the morpho-functional characteristics of athletes in different disciplines, for example: Brikci, et coll (1987) in Athletics; N.Mimouni and S.Mahour-Bacha, (1999) in Handball; KridecheM.L, et al (2016) in Basketball; Brahimi M.O et al (2021) in volleyball.

These studies were limited to analyzing the phenomena studied without elucidating many essential questions and in particular that of the impact or incidence of these morpho-functional parameters on the technique or on the level of performance.

the desire to make the most of the specific qualities of young players has become a major concern for coaches. The current level of sports performances, the main objectives of training and the prognosis of performances pushed us to address the problem of the evolution of the morphological characteristics of volleyball players by asking the following question:

Are there significant differences between controls C1 and C2, in morphological parameters?

2.Research objectives:

Determine the differences between the control phases (C1, C2) in the morphological parameters

3.Experimental content:

3.1. Sample Characteristic:

Our study will focus on a sample of volleyball players from clubs in the wilaya of Mila aged 15 to follow their development over three (03) years until the age of 17.

Our study will focus on a sample of (45) young volleyball players from (04) clubs in the wilaya of Mila aged 15 to 17 to follow their evolution throughout a sporting season; carrying out anthropometric measurements, we noticed the abandonment of the practice of many of them, and others who trained occasionally especially with the withdrawal of the competition of (02) clubs: (ECL and NROA), we considered it more judicious to focus the sample on (12) volleyball players from (02) clubs: (WRSM and EST) who trained regularly and who carried out all the measurements necessary for the study.

3.2. Experimental protocol:

To carry out this research we will:

- Define the morphological parameters of the sample studied by taking anthropometric measurements:

We used an anthropometer and an olive-tipped compass to measure the longitudinal and transverse dimensions of the body, a Lange-type fold pliers for measuring skin folds, a tape measure for measuring perimeters and a medical scale with a precision of 50 gr for weighing body weight.

4.Research methods:

We will use the following methods:

4.1. Bibliographic analysis method:

This method consists of consulting different documentary sources that deal with our theme.

4.2. Experimental method:

This method consists of taking anthropometric measurements and carrying out the tests chosen on the sample of our study.

4.3. Method of statistical analysis:

This method will allow us to collect all the results recorded, to understand the evolution and the comparison between the results and to ensure the descriptive nature of the variables retained. We will use appropriate statistical techniques to find further clarification of our research hypotheses.

5. Results and discussion

The results of differences between the control phases (C01&C02) for the morphological parameters:

To determine the differences between the control phases (C1, C2) in the morphological parameters, we must use certain statistical tests (T. Test for repeated measurements and/or Wilcoxon test) based on the Shapiro-Wilk test. to determine the distribution of the morphological parameters, and the following table (01) shows the results of descriptive statistics for the morphological parameters.

Table (01): descriptive statistics for the morphological parameters during the control phases (C1, C2).

Variables	Controles	N	$\overline{X} \pm S$	Probability of Shapiro–Wilk	Test difference to use
Weight	Controle 01	12	65,97 ± 15,84	0,146*	T test for repeated measurements
	Controle 02	12	66,08 ± 14,06	0,123*	
Size	Controle 01	12	173,42 ± 5,35	0,805*	T test for repeated measurements
	Controle 02	12	175,33 ± 4,75	0,857*	
L-Size Sitting	Controle 01	12	87,78 ± 3,03	0,417*	T test for repeated measurements
	Controle 02	12	88,57 ± 2,66	0,833*	
L-Upper limb	Controle 01	12	78,29 ± 3,96	0,217*	T test for repeated measurements
	Controle 02	12	79,08 ± 3,85	0,444*	
L-Arm	Controle 01	12	32,13 ± 2,7	0,193*	T test for repeated measurements
	Controle 02	12	32,79 ± 2,81	0,129*	
The forearm	Controle 01	12	26,43 ± 1,61	0,781*	T test for repeated measurements
	Controle 02	12	27,18 ± 1,6	0,685*	
L-Main	Controle 01	12	19,59 ± 0,61	0,409*	T test for repeated measurements
	Controle 02	12	19,77 ± 0,68	0,996*	
L-Lower Limb	Controle 01	12	87,15 ± 3,23	0,702*	T test for repeated measurements
	Controle 02	12	88,23 ± 2,82	0,326*	
L-Thigh	Controle 01	12	45,23 ± 3,54	0,389*	T test for repeated measurements
	Controle 02	12	46 ± 3,5	0,314*	
L-Leg	Controle 01	12	39,21 ± 1,85	0,043	Wilcoxon
	Controle 02	12	40,09 ± 1,95	0,980*	
L-Foot	Controle 01	12	25,91 ± 1,08	0,815*	T test for repeated measurements
	Controle 02	12	26,23 ± 1,22	0,633*	

* significant at P>5%.

Table (02): descriptive statistics for the morphological parameters during the control phases (C1, C2).continued table 1

Variables	Controles	N	$\overline{X} \pm S$	Probability of Shapiro–Wilk	Test difference to use
C-Chest EXP	Controle 01	12	88,17 ± 11,45	0,167*	T test for repeated measurements
	Controle 02	12	89,25 ± 10,36	0,314*	
C-Chest INSP	Controle 01	12	82,67 ± 9,42	0,156*	T test for repeated measurements
	Controle 02	12	83,12 ± 9,34	0,170*	
C-Chest Rest	Controle 01	12	83,98 ± 9,87	0,151*	T test for repeated measurements
	Controle 02	12	84,79 ± 9,41	0,156*	
C-Belly	Controle 01	12	77,2 ± 10,27	0,074*	Wilcoxon
	Controle 02	12	76,66 ± 9,81	0,042	
C-Basin	Controle 01	12	81,49 ± 10,18	0,110*	T test for repeated measurements
	Controle 02	12	80,95 ± 11,91	0,497*	
C-Arm Rest	Controle 01	12	26,68 ± 4,71	0,267*	T test for repeated measurements
	Controle 02	12	27,22 ± 4,48	0,326*	
C-Arm Outstretched	Controle 01	12	29,09 ± 4,59	0,181*	T test for repeated measurements
	Controle 02	12	29,48 ± 4,3	0,145*	
C-Forearm	Controle 01	12	25,7 ± 2,73	0,233*	T test for repeated measurements
	Controle 02	12	25,78 ± 2,37	0,214*	
C-Thigh	Controle 01	12	52,58 ± 7,2	0,206*	T test for repeated measurements
	Controle 02	12	52,69 ± 6,48	0,339*	
C-Leg	Controle 01	12	35,43 ± 3,82	0,840*	T test for repeated measurements
	Controle 02	12	35,58 ± 3,42	0,827*	
D-Biacrom	Controle 01	12	38,37 ± 1,57	0,602*	T test for repeated measurements
	Controle 02	12	38,76 ± 1,66	0,955*	
D-Thorax	Controle 01	12	26,61 ± 2,85	0,960*	T test for repeated measurements
	Controle 02	12	26,74 ± 2,38	0,960*	
D-Bicretal	Controle 01	12	48,98 ± 68,72	< ,0001	T test for repeated measurements
	Controle 02	12	29,23 ± 2,87	0,063*	
D-Knee	Controle 01	12	9,83 ± 1,06	0,762*	T test for repeated measurements
	Controle 02	12	9,98 ± 1,12	0,158*	
D-Ankle	Controle 01	12	7,43 ± 0,71	0,964*	T test for repeated measurements
	Controle 02	12	7,49 ± 0,66	0,621*	
D-Elbow	Controle 01	12	6,86 ± 0,55	0,298*	T test for repeated measurements
	Controle 02	12	6,98 ± 0,5	0,375*	
D-Handle	Controle 01	12	5,59 ± 0,46	0,044	Wilcoxon
	Controle 02	12	5,66 ± 0,37	0,111*	
(%) Fat mass	Controle 01	12	20,97 ± 6,96	0,283*	T test for repeated measurements
	Controle 02	12	20,74 ± 6,86	0,134*	
(%) Lean Mass	Controle 01	12	79,03 ± 6,96	0,283*	T test for repeated measurements
	Controle 02	12	79,26 ± 6,86	0,134*	

* significant at P>5%.

Following the table (01-02) which represent the descriptive statistics for the morphological parameters during the control phases (C1, C2), and according to the P values of the Shapiro-Wilk test for the two controls (C01 & C02), we will use (T-test for repeated measurements) to determine the differences between the two controls (C01 & C02) for the

variables (Weight, Height, lengths, Seated Height, Upper Limb, Arm, Forearm, Hand, Lower Limb, Thigh , Foot), Circumferences (Chest EXP/INSP/REST, Pelvis, Arm Rest/Stretched, Forearm, Thigh, Leg), Diameters (Biacrom, Thorax, Bicretal, Knee, Ankle, Elbow), (%) Fat mass, (%) Lean Mass). And for the variables (Length (leg), circumference (Belly), Diameter (Bicretal, Handle) we will use the (Wilcoxon) test to determine the differences between the two controls (C01 & C02).
The difference results are presented in table (03).

Table (03): represents the differences between the control phases (C01&C02) for the morphological parameters:

Variables	Controls	N	$\overline{X} \pm S$	Probability of the test difference	Result	Effect size
Weight	control 01	12	65,97 ± 15,84	0,8495 (a)	DNS	-
	control 02	12	66,08 ± 14,06			
Size	control 01	12	173,42 ± 5,35	0,0018 (a)	DS**	-1,182 (c)
	control 02	12	175,33 ± 4,75			
L-Size Sitting	control 01	12	87,78 ± 3,03	0,0069 (a)	DS**	-0,957 (c)
	control 02	12	88,57 ± 2,66			
L-Upper limb	control 01	12	78,29 ± 3,96	0,0039 (a)	DS**	-1,052 (c)
	control 02	12	79,08 ± 3,85			
L-Arm	control 01	12	32,13 ± 2,7	0,0032 (a)	DS**	-1,083 (c)
	control 02	12	32,79 ± 2,81			
L- Forearm	control 01	12	26,43 ± 1,61	0,0009 (a)	DS***	-1,306 (c)
	control 02	12	27,18 ± 1,6			
L-Main	control 01	12	19,59 ± 0,61	0,1666 (a)	DNS	-
	control 02	12	19,77 ± 0,68			
L-Lower Limb	control 01	12	87,15 ± 3,23	0,0034 (a)	DS**	-1,075 (c)
	control 02	12	88,23 ± 2,82			
L-Thigh	control 01	12	45,23 ± 3,54	0,0009 (a)	DS***	-1,297 (c)
	control 02	12	46 ± 3,5			
L-Leg	control 01	12	39,21 ± 1,85	0,0055 (b)	DS**	-1,000 (d)
	control 02	12	40,09 ± 1,95			
L-Foot	control 01	12	25,91 ± 1,08	0,0052 (a)	DS**	-1,003 (c)
	control 02	12	26,23 ± 1,22			

DS**: significant difference at P < 1%, DS***: significant difference at P < 1‰.
(a): T-test for repeated measures, (b): Wilcoxon test, (c): Cohen's D. (d): Correlation between biseriate ranks (r).

Table (04): represents the Differences between the control phases (C01&C02) for the morphological parameters. moreTable (03)

Variables	Controls	N	$\overline{X} \pm S$	Probability of the test difference	Result	Effect size (Cohen's D)
C-Chest EXP	control 01	12	88,17 ± 11,45	0,0267 (a)	DS*	-0,738
	control 02	12	89,25 ± 10,36			
C-Chest INSP	control 01	12	82,67 ± 9,42	0,2239 (a)	DNS	-
	control 02	12	83,12 ± 9,34			
C-Chest Rest	control 01	12	83,98 ± 9,87	0,0386 (a)	DS*	-0,678
	control 02	12	84,79 ± 9,41			
C-Belly	control 01	12	77,2 ± 10,27	0,2588 (b)	DNS	-
	control 02	12	76,66 ± 9,81			
C-Basin	control 01	12	81,49 ± 10,18	0,6419 (a)	DNS	-
	control 02	12	80,95 ± 11,91			
C-Arm Rest	control 01	12	26,68 ± 4,71	0,0396 (a)	DS*	-0,674
	control 02	12	27,22 ± 4,48			
C-Arm Outstretched	control 01	12	29,09 ± 4,59	0,0184 (a)	DS*	-0,798
	control 02	12	29,48 ± 4,3			
C-Forearm	control 01	12	25,7 ± 2,73	0,6717 (a)	DNS	-
	control 02	12	25,78 ± 2,37			
C-Thigh	control 01	12	52,58 ± 7,2	0,7260 (a)	DNS	-

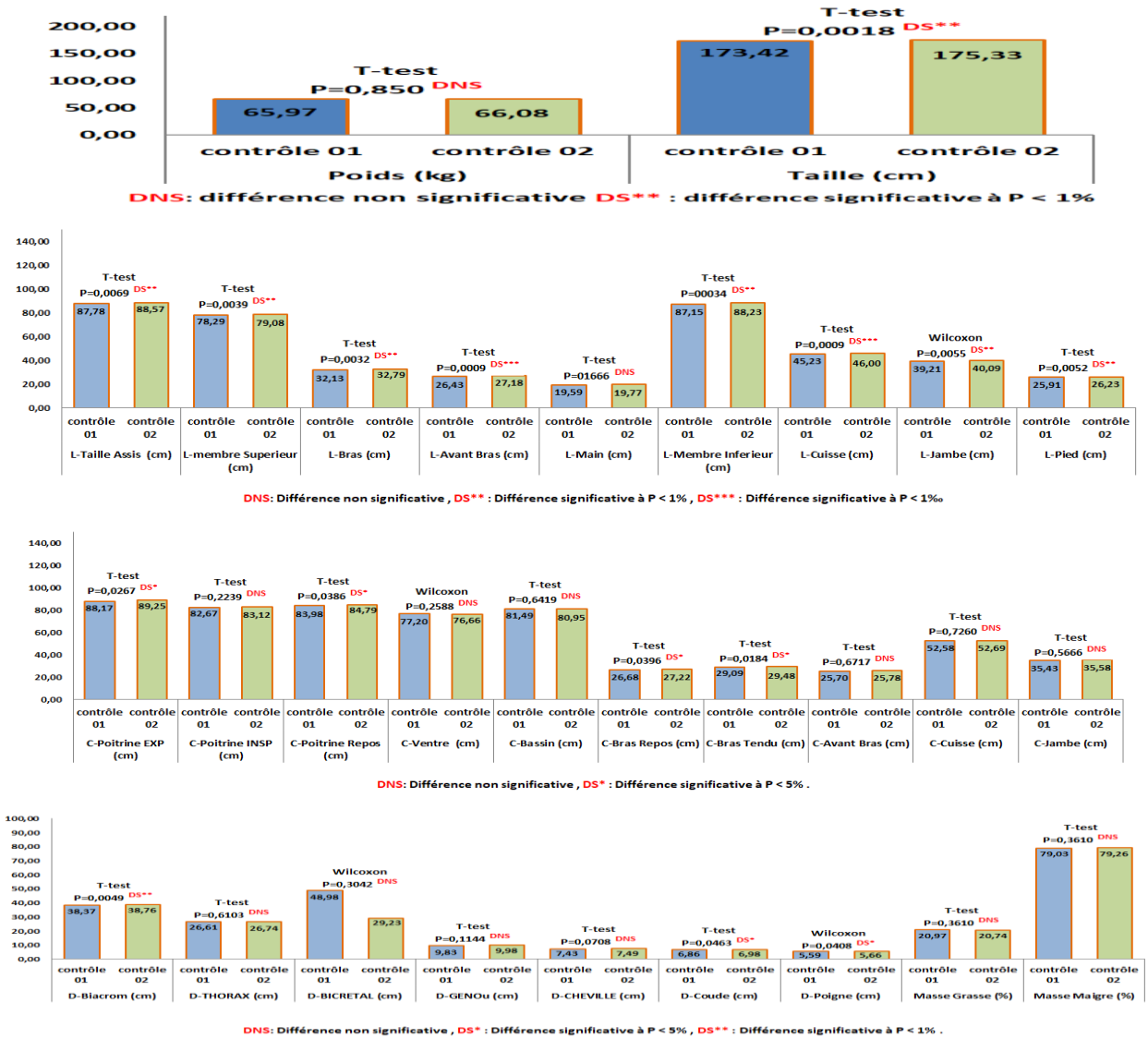
	control 02	12	52,69 ± 6,48			
C-Leg	control 01	12	35,43 ± 3,82	0,5666 (a)	DNS	-
	control 02	12	35,58 ± 3,42			
D-Biacrom	control 01	12	38,37 ± 1,57	0,0049 (a)	DS**	-1,012
	control 02	12	38,76 ± 1,66			
D-Thorax	control 01	12	26,61 ± 2,85	0,6103 (a)	DNS	-
	control 02	12	26,74 ± 2,38			
D-Bicretal	control 01	12	48,98 ± 68,72	0,3042 (b)	DNS	-
	control 02	12	29,23 ± 2,87			
D-Knee	control 01	12	9,83 ± 1,06	0,1144 (a)	DNS	-
	control 02	12	9,98 ± 1,12			
D-Ankle	control 01	12	7,43 ± 0,71	0,0708 (a)	DNS	-
	control 02	12	7,49 ± 0,66			
D-Elbow	control 01	12	6,86 ± 0,55	0,0463 (a)	DS*	-0,648
	control 02	12	6,98 ± 0,5			
D-Handle	control 01	12	5,59 ± 0,46	0,0408 (a)	DS*	-0,833
	control 02	12	5,66 ± 0,37			
(%) Fat mass	control 01	12	20,97 ± 6,96	0.3610 (a)	DNS	-
	control 02	12	20,74 ± 6,86			
(%) Lean Mass	control 01	12	79,03 ± 6,96	0.3610 (a)	DNS	-
	control 02	12	79,26 ± 6,86			

DS*: significant difference at P < 5%, DS**: significant difference at P < 1%.
(a): T-test for repeated measures, (b): Wilcoxon test.

Following the tables (03-04) which represent the results of differences between the control phases (C01&C02) for the morphological parameters, we see that:
For the variables (Weight, Height), the probability value of the T-test for repeated measurements (0.0018) for the variable (Height) is less than 1‰, this means that there is a significant difference between the phases of controls (C01&C02), and the difference due to the control (C02). The value of Cohen's D effect size (| -1.182 |) is in the range [≥0.80], which means that the effect size is “Strong” for the variable (Size). While the T-test probability value for repeated measurements (0.8495) for the variable (Weight) is greater than 5%, this means that there is not a significant difference between the control phases (C01&C02),
For the length variables (Height, Seated, Upper Limb, Arm, Lower Limb, Leg, Foot), the probability values of the T-test for repeated measurements and Wilcoxon (0.0069, 0.0039, 0.0032, 0.0034, 0.0055, 0.0052) are less than 1%, and for the length variables (Forearm, Thigh), the T-test probability values for repeated measurements (0.0009, 0.0009) is less than 1‰, this means that there is a significant difference between the control phases (C01&C02), and the differences in favor of the control (C02). While the T-test probability value for repeated measures (0.1666) for the length variable (hand) is greater than 5%, this means that there is no significant difference between the control phases (C01&C02).
The value of Cohen's D effect size (| -0.957 | , | -1.052 | , | -1.083 | , | -1.306 | , | -1.075 | , | -1.297 | , | -1.003 |) lies in the range [≥0.80], which means that the size of the effect is “Strong” for the variables (Height Sitting, Upper Limb, Arm, forearm, Lower Limb, Thigh, Foot), and the value of the effect size (Rank biserial correlation) (r) (| -1.000 |) for the length variable (Leg) is in the range [≥0.50], which means that the effect size is “Strong ".
For the circumference variables (Chest EXP/REST, Arm Rest/Stretched), the T-test probability values for repeated measurements (0.0267, 0.0386, 0.0396, 0.0184) is less than 5%, this means that they has a significant difference between the control phases (C01&C02), and the differences in favor of the control (C02).
While the T-test probability value for repeated measurements and Wilcoxon (0.2239, 0.2588, 0.6419, 0.6717, 0.7260, 0.5666) for the circumference variable (INSP Chest, Stomach, Pelvis, Forearm, Thigh, Leg) is greater than 5%, this means that there is no significant difference between the control phases (C01&C02).
The Cohen's D effect size values (| -0.738 | , | -0678 | , | -0.674 | , | -0.798 |) lie in the range [0.50 – 0.79], which means that the size of the effect is “Moderate” for circumference variables (Chest EXP/REST, Arm Rest/Stretched).
For the diameter variables (Biacrom, Elbow, Handle), the T-test probability values for repeated measurements (0.0049, 0.0463, 0.0408) is less than 5%, this means that there is a significant difference between the control phases (C01&C02), and the differences due to the control (C02).
While the T-test probability value for repeated measurements and Wilcoxon (0.6103, 0.3042, 0.1144, 0.0708) for the diameter variable (Thorax, Bicretal, Knee, Ankle) is greater than 5%, this means that they There is no significant difference between the control phases (C01&C02).
The values of Cohen's D effect size (| -1.012 | , | -0.833 |) for the diameter variables (Biacrom, Grip) lie in the range [≥0.80], which means that the size of the The effect is “Strong”, and for the diameter variable (elbow) Cohen's D effect size value (| -0.648 |) is in the range [0.50 – 0.79], which means that the effect size of the effect is “Moderate”.

For the body composition variables ((%) Fat Mass, (%) Lean Mass), the T-test probability values for repeated measurements (0.3610, 0.3610) are greater than 5%, this means that there is no significant difference between the control phases (C01&C02).

Graph (01): represents the results of Differences between the control phases (C01&C02) for the morphological parameters



6. Discussion:

* For the variable (Size), the results revealed to us that there is a significant difference between the control phases (C01&C02), and the difference in favor of the control (C02), the size of the effect is “Strong” for the variable (Height), which agrees with the results of (Mroczek & all, 2017) and (Tiziana D'isanto & all 2018) who found statistically significant differences in terms of size.* For the variable (Weight) results revealed to us that there is not a significant difference between the control phases (C01&C02), which was approved by the study of (Tim Gabbett, Boris Georgieff, 2007) and (the study of Krideche& all,2016).* For the length variables (Seated Waist, Upper Limb, Arm, Lower Limb, leg, Foot), and for the length variables (Forearm, Thigh), the results revealed to us that there is a significant difference between the control phases (C01&C02), and the differences in favor of the control (C02). which means that the effect size is "Strong" for the variables (Height Sitting, Upper Limb, Arm, Forearm, Lower Limb, Thigh, Foot), which means that the effect size is " Strong” for the variables (Sized Waist, Upper Limb, Arm, forearm, Lower Limb, Thigh, Foot, leg). which was confirmed in the conclusion of the thesis of (Chachou A.A, 2021): There is a statistically significant relationship between the different morphological criteria.* On the other hand, for the length variable (hand), we noted that there is not a significant difference between the control phases (C01&C02). Our results agree and are close to those from (the study by Brahimi Mohamed Oussama & all, 2021) which found great homogeneity at the level of these segments.

Conclusion:

The ambition of this work was to contribute to the development of references specific to young Algerian volleyball players in the 15-17 age group and to propose a battery including morphological data specific to this age group.
The importance of these aspects, which is not only specific to this Specialty, can be justified by the requirement to take into account the morphological characteristics of the athlete to claim efficient planning of his development and evaluation. of his state of performance through training.
The main goal of our research that we carried out allowed us to highlight and follow the evolution of the morpho-functional characteristics of volleyball players aged 15-17.
* The conformity of the data collected on the U15s and the U17s, with that reported in the literature.
* Significant differences for all indices of Physical development, between our young volleyball players and the young globalists
.Determination of the morphological profile of young Algerian volleyball players aged between 15 and 17 years old In order to identify a typical profile of the young Algerian player of this age.
Finally, we hope through other studies in perspective to be part of the extension and deepening of our work, to discern with more insight the problem of the evolution of certain parameters and morphological indices of the young Algerian U17 volleyball player, by treating a more large number of variables which are lacking in the progress and continuity of its training process.

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