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Anthropometric variables and body composition and SEMG frequency of the spine rectifier in children with scoliosis and scoliotic posture

Zmienne antropometryczne i skład ciała a częstotliwość SEMG prostownika grzbietu u dzieci ze skoliozą i postawą skoliotyczną

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Abstract

The purpose of the research was the analysis of the relationship between the anthropometric variables and body composition and frequency of SEMG rectifier of the spine in children with scoliosis and scoliotic attitude. Backbone has been examined by optoelectronic Diers formetric III 4 d. The method photogrammetric video recording of back surface through a process image stereography. Body composition was determined by using the TANITA body composition Analyzer MC 780 m. Analysis of the electromyographical of the spine extensors was performed with the help of 12 channel camera Noraxon TeleMyo DTS.

Spine examination method Diers formetric III 4 d has shown in 103 (41%) of children scoliosis. The attitude of scoliotic diagnosed with 141 (56.17%) children. With the correct attitude was 7 (3.0%) children. The most important and significant statistically predictors for model's anthropometric variables, body composition and the frequency of the charger back test in different positions within the Group of scoliosis were the variables BMI (p = 0.01) and percent fat (%) (p = 0.03). Variance explained by the independent variables in the model adopted is 40% of the total variation (R ^ 2 = 0.40), indicating a small adjustment to the data, however, anticipated the level of statistical significance (p = 0.001) have been met, and also received good the value of the test statistic F = 3.33. In the group the basics of scoliotic the mass of fat (p = 0.01). The model was explained only in 26% (R ^ 2 = 0.26), which is low, but anticipated the level of statistical significance (p = 0.01) was also met, and also received the appropriate statistical test value F = 5.10. She has a substantial dependency between certain variables to the anthropometric and body composition and frequency of SEMG rectifier of the spine in children with scoliosis and scoliotic attitude.

Key words: anthropometric variables, children’s body composition, scoliosis, scoliotic posture, SEMG frequency of the spine rectifier

Introduction

Idiopathic scoliosis is a systemic disease, which is accompanied by biochemical changes, which reflect the metabolism of bone tissue, cartilaginous, and neural [1]. Within the meaning of etiopathogenetic the scoliosis is only a symptom, the external expression of an unrecognized pathology, which may appear in any episode of the spine and the age of the child. Even though scoliosis is manifestly distorting attitudes, at the same time, it is the effect of the compensating capability of the body [2-5]. Causes of scoliosis and idiopathic have not yet been explained. There is a consensus that idiopathic scoliosis is conditional on uses multi-factor authentication. An extremely extensive literature in this field describes the irregularities at the level of systems, organs, tissues, cells, and genes, without prejudging their primary or secondary character [6-8].

There is no widely accepted theory of the etiopathogenesis (case history) scoliosis. Many proponents of the concept are contingent upon the CNS pathology uses multi-factor authentication, causing changes to the layout of postural. Currently the most followers has the concept uses multi-factor authentication (including genetically modified organisms) contingent upon the pathologies of the central nervous system, concerning in particular the broader postural system, which long effect, most likely by the deep muscles of the back (cross-system spinosum), increasing spine at individually variable (contingent upon uses multi-factor authentication) vulnerability on an instance of distortion [9.10].

Factors affecting the development of idiopathic scoliosis are very complex. The impact of changes in the genome seems to play a central role in the induction of scoliosis through the central nervous system (CNS). A chain of these factors that cause idiopathic scoliosis include: genetics-regulation of calcium-melatonin-calmodulin-puberty-be completed using connective tissue-biochemical disorders-Neuropsychological predisposition [11]. The purpose of the research was the analysis of the relationship between the anthropometric variables and body composition and frequency of SEMG rectifier of the spine in children with scoliosis and scoliotic attitude.

Material and Methods

The studies involved 251 children, including 113 girls (45.02%) and 138 boys (54.98%) at the age of 7 and 8 years of primary school in Kielce (Poland) (table 1). Selection of subjects was mixed, advance the criteria which should correspond to each group. The research was conducted between November 2016 and July 2017 in the laboratory of Posturology to the Faculty of medicine and health sciences, Jan Kochanowski University in Kielce. All test procedures performed in accordance with the Declaration of Helsinki of 1964, and with the consent of the Campus Ethics Commission UJK in Kielce (resolution No. 5/2015). The guardians of the children were informed about the purpose of the study and expressed written consent for their children's participation in the study. The study was non-invasive and free of charge. The patients willingly participated in the study and perceived it as a concern about their state of health. Body height test was determined using the tape to the nearest centimeter 1 cm. Body composition was determined by using the TANITA body composition Analyzer MC 780 m. Body composition was assessed using the bioelectrical impedance analysis method, which consisted in analysing resistance of the electric current flowing through the tissues. This analysis uses knowledge about the prevalence of electrolytes and better electrical conductivity of muscle tissue, which has a significant amount of water. Adipose tissue is characterized by greater inhibition in the flow of electricity. The BIA study is a reliable, non-invasive and an easily accessible means for assessing the parameters of body composition. Tanita MC 780 MA body composition analyser was used as a research tool. As a result of the measurement, the following body composition variables were obtained: Body Mass (kg), Body Mass Index, Fat Mass (%), Fat Mass (kg), Fat Free Mass (kg), Muscle Mass (kg), Total Body Water (kg), Total Body Water (%), Basal metabolic rate (kJ), Basal metabolic rate (kcal), Bone Mass (kg), Proteins (kg).

Backbone has been examined by optoelectronic Diers formetric III 4 d. The method photogrammetric video recording of back surface through a process image stereography. Based on the data received was precise, three-dimensional model of the spine. Having regard to the anatomical and biomechanical principles of the model, it was possible to calculate the permanent anatomical points, curves of the spine and the spatial forms of body. Diers method formetric III 4 d is adaptor and, above all, non-ionizing way to study the spine. The room in which the measurement was the body posture was dimmed, so that the Sun's rays do not fell directly on the body. The test taken apart to shorts and barefoot has become backwards before device consisting of a digital video camera and a projector. The projector was emitting parallel lines on the surface of the test back, and digital video camera transmits a three-dimensional image to your computer. The study was conducted in DiCAM by measuring the Average, of the execution of a sequence of twelve photos that by creating the average value undercut the variance and thus improve the value of clinical research. In accordance with the guidelines of the camera manufacturer Diers formetric III 4 d the occurrence of scoliosis and scoliotic were observed when examining the values of the three parameters: the skewness of the pelvis (mm), lateral (mm) and the rotation surface (°). Scoliotic attitude occurred when the skewness of the pelvis was < 5 mm, side deviation was 5 mm surface rotation < was < 5 degrees. While she has scoliosis, when the skewness of the pelvis was 5 mm, lateral deviation was 5 mm and surface rotation was 5 degrees. In order to assess the presence of attitude scoliotic or scoliosis all three conditions have to be met. Electromyographical analysis was performed using a 12-channel camera Noraxon TeleMyo DTS. The device had a certificate (Certyficate Production Quality Assurance Directive 93/42/EEC Medical Dewices Annex V). Uses the pregel electrode with a diameter of 3 cm. use the test electromyographic you can show the relationship between the muscular disorder and the appearance of other symptoms, including the case of scoliosis. The skin test was cleaned using abrasive fluid, at the place of application of the electrodes. Electrode positioned parallel to the direction of the tested muscle fibers. The distance between them was about two inches. Extensor of the spine has been studied in thoracic and lumbar region, both on the left and on the right side. Each trial lasted 10 seconds. Raw write signal electromyographic was presented in the form of a bar chart. It considers the average frequency of the voltage rectifier muscle Ridge expressed in Hertz (Hz) and its median. On the Y axis is the frequency of the voltage, while the x-axis-write time expressed in seconds. The test results shall consider the scale of intensity of tension in the time interval that was 100 milliseconds. The study was applied continuous recording mode. SEMG recording was performed directly on the skin.

Functional potentials recorded from extensor of the spine in thoracic and lumbar curvature curves at the top:

1. in habitual, standing (Frankfurt),

2. in the rest position: lying (the lower limbs are straight in the joints of the knee, upper limbs stacked along the trunk),

3. in terms of isometric contraction:

- in lying (the lower limbs are straight in the joints of the knee, upper limbs stacked along the torso, pelvis stabilized) tested floats trunk within the limits of the movable property of the spine, and continued it in this position for 10 seconds,
- in lying front, with stable upper torso (shoulders and chest, limbs arranged as before) the test rises both lower limbs as maximum height and remained for 10 s.

The average signal spectrum frequency was analysed SEMG, used to assess the degree of muscle fatigue, muscle work time characteristics (lack of arousal, the constant activity, improper agitation-early, late, too short, too longest). Analysis of SEMG was painless and non-invasive. Measurement of SEMG was in line with the recommendations of the SENIAM (Surface ElectroMyoGraphy for the Non-Invasive Assessment of Muscles), a European research programme, containing a series of guidelines on the selection of type of electrodes, their location, Anatomy and function the muscle tests muscle groups and signal processor and hardware conditions.

Before the start of the analytical process made Kolmogorov – Smirnov test for determining the normal schedules. Served it to embark on a parametric method in statistical analysis. To assess the significance of the difference's variables' anthropometric and body composition between girls and boys, and 7 and 8-year old in groups of scoliosis, scoliotic and with one-way applied to analysis of variance ANOVA. To evaluate differences in body posture in the first full test of Chi2, due to the layout of the binominal most of the analyzed variables. To evaluate the collinear constraints between the Pearson correlation analysis applied to variables. Multiple regression models, single-step and progressive were used to determine dependencies and designate the predictors for the dependent variables: 's anthropometric, body composition and frequency of SEMG rectifier. Prior to the regression analysis was carried out has gone through a cross-validation. That verifies the parameter for evaluation of built models was the coefficient of determination, the adjusted coefficient of determination and the test statistic and level of statistical significance, which clearly allowed choose models with level statistical significance of $p < 0.05$.

Results

Spine examination method Diers formetric III 4 d has shown in 103 (41%) of children scoliosis. The attitude of scoliotic diagnosed with 141 (56.17%) children. With the correct attitude was 7 (3.0%) children (table 1). Measure values and dispersion for variables' anthropometric and body composition have varied schedules in girls and boys in groups attitudes scoliotic, scoliosis and normal. The largest absolute value differentiation variables tested in girls were WMD (kJ). In the Group of scoliosis and the diversity of BMR (kJ) was (S = 452), in Group attitudes scoliotic the diversity of BMR (kJ) was (S = 440) and with the diversity of BMR (kJ) was (S = 352) (table 2.3). Boys in the Group of scoliosis also observed the greatest absolute diversity values for variable BMR (kJ) (S = 649,5) and in Group attitudes scoliotic (S = 487) and standard (S = 440) (table 2.3). Single factor analysis of variance within the Group of scoliosis has revealed significant differences in the level of BMR (kJ) between girls and boys. In boys with scoliosis BMR (kJ) (F = 21,64) (p = 0.001), BMR (kcal) (F = 21,87) (p = 0.001) and Bone Mass (kg) (F = 7:12), (p = 0.01) were significantly higher. Analysis of variance in Group attitudes scoliotic showed that boys were significantly taller (F = 6.39) (p = 0.01), had significantly greater Fat Mass (%) (F = 15.85) (p = 0.001), Fat Free Mass (kg) (F = 5,32) (p = 0.02), Muscle Mass (kg) (F = 5,32) (p = 0.02), Total Body Water (%), (F = 16,13) (p = 0.001), BMR (kJ) (F = 62,74) (p = 0.001), BMR (kcal) (F = 61,88) (p = 0.001), Bone Mass (kg) (F = 20,50) (p = 0.001) and bone mass (kg) (table 4). There were no significant differences between girls and boys in standard (table 5). There were also significant differences in the levels of intra-group's anthropometric variables and body composition in girls and boys. Regression model for the group with the standard did not reach the planned statistical significance, therefore is not shown and is not recognized as valid in modeling dependencies between the anthropometric variables and body composition and the frequency of the charger spine test in different positions. The most important and statistically model predictors for Spine examination method Diers formetric III 4 d has shown in 103 (41%) of children scoliosis. The attitude of scoliotic diagnosed with 141 (56.17%) children. With the correct attitude was 7 (3.0%) children (table 1). Measure values and dispersion for variables' anthropometric and body composition have varied schedules in girls and boys in groups attitudes scoliotic, scoliosis and normal. The largest absolute value differentiation variables tested in girls were WMD (kJ). In the Group of scoliosis and the diversity of BMR (kJ) was (S = 452), in Group attitudes scoliotic the diversity of BMR (kJ) was (S = 440) and with the diversity of BMR (kJ) was (S = 352) (table 2.3). Boys in the Group of scoliosis also observed the greatest absolute diversity values for variable BMR (kJ) (S = 649,5) and in Group attitudes scoliotic (S = 487) and standard (S = 440) (table 2.3). Single factor analysis of variance within the Group of scoliosis has revealed significant anthropometric variables and body composition and the frequency of the charger back test in different positions within the Group of scoliosis were variables: BMI (p = 0.01) and percent fat (%) (p = 0.03) (table 5). Variance explained by the independent variables in the model adopted is 40% of the total variation (R ^ 2 = 0.40), indicating a small adjustment to the data, however, anticipated the level of statistical significance (p = 0.001) have been met, and also received good the value of the test statistic F = 3.33. In the group the basics of scoliotic the most important and statistically Predictor model was variable, BMI (p = 0.001) and the mass of fat (p = 0.01). The model was explained only in 26% (R ^ 2 = 0.26), which is low, but anticipated the level of statistical significance (p = 0.01) was also met and received the appropriate statistical test value F = 5.10 (table 5).

Discussion

Scoliosis and scoliotic attitude involve the construction of the body and this, in turn, with its composition. With proper storage and correct body structure, with the right shape of the spine, chest, pelvis and lower extremities and with proper structure joints and muscle contractures and improvement and to maintain the habit of correct posture is much easier. The composition and construction of the body during development are repeated changes resulting from the processes of growth and differentiation that are determined genetically and modified by environmental factors. Analysis of body composition is an important element of the assessment the health status of children with scoliosis. Since the 1940s the EMG is used to assess the function and muscle activity [12]. Electromyographic allows you to control muscle balance on the tops of the radical and avoids improper dredging muscle asymmetry, resulting in stimulation of disturbing forces balance. At the same time, an analysis of EMG can be used for effective recognition of valid, helpful corrective action, patterns of muscle work. It was found that the asymmetrical muscle activity is associated with increased axial rotation, which in turn is associated with an increase in the angle of the Cobb [13.14]. EMG testing allows for precise determination of motor function in patients with locomotor impairments and allows you to record natural muscle activation signals. With electromyographic have been reported in patients with scoliosis response delay muscle deep dorsal lumbar convex side, in relation to the concave [15]. Since the beginning of the research in electromyography muscle of extensor of the Ridge, it was noted that there is a relationship between the curvature of spine and an extensor muscle tension the Ridge [16, 17, 18]. Therefore, the goal of therapy of scoliosis should be the restoration of normal relations between the vertebrae so that the distribution of the pressing forces and charged to the vertebral central shear, rather than joint-like [19-23]. Passive structures such as stabilizing intervertebral discs, joints, ligaments, intervertebral are not able to provide the correct stability segmental in the sagittal plane [24-26]. Dystonia, which affects children with scoliosis, calls the destabilisation and the additional overhead of listed structures. Until the introduction of the forces of the origin of the neuro-muscular brings a reduction in movement in the sagittal plane [27]. Knowledge of these issues can significantly help in the treatment of scoliotic attitudes and scoliosis.

Conclusions

The most important and significant statistically predictors for model's anthropometric variables, body composition and the frequency of the charger back test in different positions within the Group of scoliosis were the variables BMI and fat percentage (%). In the group the basics of scoliotic the most important and statistically Predictor model was the variable mass of fat and BMI. The most important and significant statistically predictors for model's anthropometric variables, body composition and the frequency of the charger back test in different positions within the Group of scoliosis were the variables BMI and fat percentage (%). In the group the basics of scoliotic Spine examination method Diers formetric III 4 d has shown in 103 (41%) of children scoliosis. The attitude of scoliotic diagnosed with 141 (56.17%) children. With the correct attitude was 7 (3.0%) children (table 1). Measure values and dispersion for variables' anthropometric and body composition have varied schedules in girls and boys in groups attitudes scoliotic, scoliosis and normal. The largest absolute value differentiation variables tested in girls were WMD (kJ). In the Group of scoliosis and the diversity of BMR (kJ) was (S = 452), in Group attitudes scoliotic the diversity of BMR (kJ) was (S = 440) and with the diversity of BMR (kJ) was (S = 352) (table 2.3). Boys in the Group of scoliosis also observed the greatest absolute diversity values for variable BMR (kJ) (S = 649,5) and in Group attitudes scoliotic (S = 487) and standard (S = 440) (table 2.3). Single factor analysis of variance within the Group of scoliosis has revealed significant the most important and statistically Predictor model was the variable mass of fat and BMI. She has a substantial dependency between certain variables to the anthropometric and body composition and frequency of SEMG rectifier of the spine in children with scoliosis and scoliotic attitude.

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Table 1. Distribution of anthropometric variables and body composition in subjects with scoliosis

Distribution of anthropometric variables and body composition in girls with scoliosis						
Variable	Average	Confidence		Minimum	Maximum	Standard deviation
		-95,00%	95,00%			
Body height (cm)	133,97	131,39	136,56	118,00	152,00	7,97
Body mass (kg)	29,35	27,24	31,46	17,50	40,20	6,50
BMI	16,22	15,36	17,08	10,40	23,80	2,66
Fat Mass (%)	21,17	19,66	22,67	11,60	30,30	4,64
Fat Mass (kg)	6,39	5,58	7,20	2,00	12,20	2,49
Fat Free Mass (kg)	22,96	21,51	24,42	15,20	31,30	4,49
Muscle Mass (kg)	21,75	20,36	23,14	14,40	29,70	4,28
Total Body Water (kg)	16,80	15,74	17,87	11,10	22,90	3,28
Total Body Water (%)	71,57	43,34	99,79	51,00	601,00	87,07
BMR (kJ)	4533,18	4386,66	4679,70	3724,00	5573,00	451,99
BMR (kcal)	1083,46	1048,44	1118,48	890,00	1332,00	108,03
Bone Mass (kg)	1,21	1,14	1,28	0,80	1,60	0,22
Proteins (kg)	4,95	4,62	5,27	3,30	6,80	1,00
Distribution of anthropometric variables and body composition of boys with scoliosis						
Variable	Average	Confidence		Minimum	Maximum	Standard deviation
		-95,00%	95,00%			
Body height (cm)	133,70	131,51	135,90	122,00	158,00	8,79
Body mass (kg)	31,31	28,65	33,96	18,10	66,10	10,63
BMI	17,20	16,18	18,22	11,20	30,20	4,09
Fat Mass (%)	20,70	18,96	22,44	10,00	42,80	6,97
Fat Mass (kg)	7,08	5,77	8,39	1,90	28,30	5,25
Fat Free Mass (kg)	24,13	22,69	25,57	16,20	42,70	5,76
Muscle Mass (kg)	22,88	21,50	24,27	15,20	40,50	5,54
Total Body Water (kg)	17,62	16,55	18,68	11,90	31,30	4,25
Total Body Water (%)	58,15	56,88	59,43	41,90	65,70	5,11
BMR (kJ)	5083,55	4921,56	5245,54	4058,00	7176,00	648,49
BMR (kcal)	1216,41	1177,42	1255,39	970,00	1715,00	156,07
Bone Mass (kg)	1,35	1,28	1,42	1,00	2,20	0,27
Proteins (kg)	5,15	4,82	5,47	3,30	9,20	1,29

Table 2. Distribution of anthropometric variables and body composition in subjects with a scoliotic posture

Distribution of anthropometric variables and body composition in girls with a scoliotic posture						
Variable	Averag e	Confidence		Minimum	Maximum	Standard deviation
		-95,00%	95,00%			
Body height (cm)	130,91	129,22	132,60	112,00	149,00	7,09
Body mass (kg)	28,74	27,07	30,40	17,10	50,20	6,98
BMI	16,55	15,89	17,20	12,00	24,40	2,75
Fat Mass (%)	22,19	21,06	23,32	15,40	38,50	4,72
Fat Mass (kg)	6,61	5,89	7,32	2,90	16,90	3,00
Fat Free Mass (kg)	22,08	21,06	23,10	14,00	34,50	4,27
Muscle Mass (kg)	20,93	19,96	21,91	13,20	32,70	4,08
Total Body Water (kg)	16,28	15,54	17,03	10,20	25,30	3,14
Total Body Water (%)	56,92	56,08	57,77	45,10	62,10	3,53
BMR (kJ)	4429,43	4324,52	4534,34	3615,00	5740,00	440,00
BMR (kcal)	1060,39	1035,12	1085,65	864,00	1372,00	105,95
Bone Mass (kg)	1,17	1,12	1,22	0,80	1,80	0,21
Proteins (kg)	4,75	4,53	4,98	3,00	7,40	0,93
Distribution of anthropometric variables and the body composition of boys with a scoliotic posture						
Variable	Averag e	Confidence		Minimum	Maximum	Standard deviation
		-95,00%	95,00%			
Body height (cm)	134,24	132,24	136,24	116,00	158,00	8,46
Body mass (kg)	29,67	27,91	31,43	18,70	63,40	7,43
BMI	16,27	15,68	16,85	13,10	25,40	2,47
Fat Mass (%)	18,96	17,79	20,12	11,70	32,60	4,92
Fat Mass (kg)	5,91	5,16	6,66	2,40	20,70	3,17
Fat Free Mass (kg)	23,79	22,72	24,87	16,10	42,70	4,55
Muscle Mass (kg)	22,46	21,43	23,49	15,10	40,50	4,35
Total Body Water (kg)	17,33	16,53	18,13	11,80	31,30	3,37
Total Body Water (%)	59,34	58,48	60,19	49,40	64,80	3,61
BMR (kJ)	5048,61	4933,41	5163,81	4146,00	7176,00	486,70
BMR (kcal)	1209,23	1181,23	1237,22	991,00	1715,00	118,29
Bone Mass (kg)	1,33	1,28	1,38	1,00	2,20	0,21
Proteins (kg)	5,05	4,81	5,29	3,30	9,20	1,01

Table 3. Distribution of anthropometric variables and body composition in subjects with the norm

Distribution of anthropometric variables and body composition in girls with the norm						
Variable	Average	Confidence		Minimum	Maximum	Standard deviation
		-95,00%	95,00%			
Body height (cm)	130,50	118,77	142,23	122,00	140,00	7,37
Body mass (kg)	28,23	18,48	37,97	20,20	34,60	6,12
BMI	16,50	11,89	21,11	13,60	20,50	2,89
Fat Mass (%)	22,30	16,06	28,54	18,50	27,80	3,92
Fat Mass (kg)	6,45	2,57	10,33	3,70	9,60	2,44
Fat Free Mass (kg)	21,78	15,66	27,89	16,50	25,00	3,84
Muscle Mass (kg)	20,63	14,82	26,43	15,60	23,70	3,65
Total Body Water (kg)	15,95	11,50	20,40	12,10	18,30	2,80
Total Body Water (%)	56,95	52,29	61,61	52,90	59,90	2,93
BMR (kJ)	4404,50	3844,86	4964,14	3916,00	4715,00	351,70
BMR (kcal)	1052,75	918,99	1186,51	936,00	1127,00	84,06
Bone Mass (kg)	1,15	0,85	1,46	0,90	1,30	0,19
Proteins (kg)	4,68	3,32	6,03	3,50	5,40	0,85
Distribution of anthropometric variables and body composition of boys with the norm						
Variable	Average	Confidence		Minimum	Maximum	Standard deviation
		-95,00%	95,00%			
Body height (cm)	135,33	114,50	156,17	130,00	145,00	8,39
Body mass (kg)	29,93	15,78	44,09	26,30	36,50	5,70
BMI	16,23	13,58	18,89	15,30	17,40	1,07
Fat Mass (%)	17,67	15,64	19,69	17,10	18,60	0,81
Fat Mass (kg)	5,30	2,07	8,53	4,50	6,80	1,30
Fat Free Mass (kg)	24,63	13,71	35,56	21,80	29,70	4,40
Muscle Mass (kg)	23,27	12,85	33,68	20,60	28,10	4,19
Total Body Water (kg)	18,03	10,13	25,94	16,00	21,70	3,18
Total Body Water (%)	60,33	58,54	62,13	59,50	60,80	0,72
BMR (kJ)	5140,67	4046,85	6234,48	4858,00	5648,00	440,32
BMR (kcal)	1228,67	967,06	1490,27	1161,00	1350,00	105,31
Bone Mass (kg)	1,37	0,85	1,88	1,20	1,60	0,21
Proteins (kg)	5,23	2,72	7,75	4,60	6,40	1,01

Table 4. Analysis of ANOVA differences for anthropometric and body composition variables between girls and boys in the scoliosis, scoliotic posture and normal posture groups

Różnice zmiennych antropometrycznych i składu ciała pomiędzy dziewczętami i chłopcami						
	Scoliosis		Scoliotic posture		Correct posture	
	F	p	F	p	F	p
Body height (cm)	0,02	0,88	6,39	0,01	0,66	0,45
Body mass (kg)	1,07	0,30	0,59	0,44	0,14	0,72
BMI	1,78	0,19	0,41	0,52	0,02	0,89
Fat Mass (%)	0,14	0,71	15,85	0,001	3,87	0,11
Fat Mass (kg)	0,59	0,44	1,79	0,18	0,53	0,50
Fat Free Mass (kg)	1,16	0,28	5,32	0,02	0,84	0,40
Muscle Mass (kg)	1,19	0,28	4,59	0,03	0,80	0,41
Total Body Water (kg)	1,04	0,31	3,63	0,06	0,85	0,40
Total Body Water (%)	1,52	0,22	16,13	0,001	3,67	0,11
BMR (kJ)	21,64	0,001	62,74	0,001	6,12	0,06
BMR (kcal)	21,87	0,001	61,88	0,001	6,11	0,06
Bone Mass (kg)	7,12	0,01	20,50	0,001	2,05	0,21
Proteins (kg)	0,68	0,41	3,17	0,08	0,63	0,46

Table 5. Stepwise regression model between the anthropometric variables and body composition and the frequency of the rectifier ridge group scoliosis and scoliotic attitudes

Stepwise regression model in a group of scoliosis[1]						
Variable	b*	Std. Error Z b*	b	Std. Error Z b	t (100)	p
Intercept			83,57	19.69	4.25	**0.001**
BMI	-1,01	0.38	-6.86	2.60	-2.64	**0.01**
Fat Mass (%)	0.62	0.29	2.47	1.14	2.16	**0.03**
R= 0,40 R^2= 0,16 Corrected R^2= 0,12 F (5,97)=3,33; p=0,001						
Stepwise regression model in the group scoliotic attitudes						
Variable	b*	Std. Error Z b*	b	Std. Error Z b	t (139)	p
Intercept			141,80	27.52	5.15	**0.001**
BMI	-0.77	0.25	-7.44	2.37	-3.14	**0.001**
R= 0,26 R^2= 0,07 Corrected R^2= 0,06 F (2,138) = 5,10; p=0,01						

1 * b - constant regression, Std. Error Z b* - standard error of the regression constant; b - the partial regression coefficients, Std. Error Z b - standard error of the partial regression coefficient, t - statistical test, p - level of significance