MIROSŁAW MROZKOWIAK
The University of Warmia and Mazury in Olsztyn

BODY POSTURE OF CANDIDATES FOR LAND FORCES OFFICERS

ABSTRACT

The research covered 1802 recruits aged 21 to 23, in the autumn levy to the Land Forces Military Academy. To assess the values of selected parameters describing the habitual posture, a computer stand for the evaluation of body posture – a Posturometer M was used.

The typical body posture of the examined candidates to the professional military service is characterized by: a slightly bent trunk and the pelvis moderately rotated to the left, moderately deepened chest kyphosis and considerably deepened loin lordosis, a very protruding right angle of the scapula, great asymmetry of waist triangles: the right one is higher and wider, moderate shoulders' asymmetry, the right one is higher, the course of spinous processes most often deflected to the left by 1.31 mm with the peak at the height of the 9th thoracic vertebra.

Key words: *body posture, faulty postures, scolioses.*

INTRODUCTION

The human body is shaped by external conditions, intellectual, spiritual, and emotional experiences. As one ages, an increase takes place in the morphophysiological stabilization of the body, which, however, does not exclude the short-lived variability of the organism's functions happening under the influence of stimuli in the external and internal environment. It ensues that health, individual values and social psychical life are to a certain degree independent of the body build and functions. One can draw here from the history of literature, art, and science very many names of distinguished creators who were burdened with congenital or acquired chronic diseases, which affected the normal body build and functions to a serious degree. On the other hand, one can give many examples of people reputed to be the pictures of health, but who are intellectually, psychologically and ethically members of society of small worth. One can, however, also say that though symptoms of psychical states are dependent on the body structure and functions, at the same time they show certain independence from that structure and functions. The factor valuing psychophysical connections is consciousness. Its role in physiological reactivity perhaps determines the result of the psychophysical activity of both a healthy and a sick body. Consciousness

as the synthesis of all information, that is to say, information about information, is – as it seems – a human attribute. It can shape, in a purposeful and intentional way, body functions and control its behaviour (Romanowski 1986).

The aim of the studies was to determine the general parameters describing the body posture of an adult, healthy and fully fit human, applying for the professional military service.

MATERIAL AND METHODS

The research covered 1802 recruits aged 21 to 23, in the autumn levy to the Land Forces Military Academy in Wrocław, the NCOs' School of Land Forces in Poznań, Toruń and Zegrze, (Tab. 1). Candidates qualified for analysis were those who successfully underwent medical examination and physical fitness tests and the examination technique and methodology did not arouse any reservations (Drozdowski, Sokołowski 2006). The analysis was conducted on the measurements of 1802 people: 60 women and 1742 men. The examination included an evaluation of body posture in the habitual posture. To assess the values of selected parameters, a computer stand for evaluation of body posture – Posturometer M was used. The examination's methodology and technique conforms to the adopted and described rules (Mrozkowiak 2003).

The obtained study results were developed statistically, determining the mean value, the standard deviation, the coefficient of variability and the minimum and maximum value.

A statistical description was performed of features within the pelvis-backbone in all studied persons and of correlation coefficients. On account of the relatively small number of women in individual military specialties, detailed statistical elaborations were departed from (Tab. 1).

RESULTS

Sagittal plane – angular parameters

In the case of the lumbosacral segment inclination, the mean value is 3.52 degrees, with a very great range from 0.0 to 17.0 degrees. The mean value of the thoracolumbar segment's inclination is 5.75 degrees, with even greater boundary values: 0.0 – 33.3 degrees. The mean value of the upper thoracic segment's inclination is 12.28 degrees, with even greater extreme values: 0.0 – 78.3 degrees. The mean value of the sum of inclination angles for the considered backbone segments is 23.2 degrees, with the range from 0.0 to 45.0 degrees. In the case of the angle of chest kyphosis and loin lordosis, the values of both angles are similar. The mean value of KKP is 162.36 degrees, with the spread of results from 147.9 to 176.2 degrees. The mean value of KLL is 170.3 degrees, with a similar

range of results from 154.0 to 189.0 degrees. The trunk bend and extension angle measured by the size of C7's deviation from the vertical line drawn through S1 is significantly greater in the case of KPT-. Its mean value is 2.73 degrees, with also a great range from 0.0 to 9.7 degrees. The mean angle of trunk extension is only 0.18 degrees, and the range is slightly smaller because from 0.0 to 6.5 degrees.

Linear parameters

The total mean backbone length measured along the vertical line from C7 to S1 is 354.91 mm with the range from 258.8 to 404.3 mm. The backbone length is on the average 20.19% of the studied persons' height, with a very great range from 10.3 to 49.4 %. The mean and percentage value referred to DCK for the length, height and depth of chest kyphosis is, respectively: 297.91 mm and is 84.01% of its length, with min/max values 199.8/2077.0 mm and from 59.8 to 98.7 %, 228.74 mm and is 64.18 % with min/max 130.3/1457.0 and 44.8/83.3 % and for GKP -0.01 and 10.37 mm. The depth of chest kyphosis has, in this case, not only a positive value. The result: -0.01, is the mean depth of chest kyphosis in slight inversion. The extreme values are respectively: 0.0/12.2 mm and 0.0/32.7 %. Mirror measurements for loin lordosis were as follows: the length 224.67 mm and 63.91 %, with the range 22.6 – 330.3 mm and 39.4 – 88.1 %, the height 125.63 mm and 36.3 %, with extreme values 22.6 and 330.3 mm and 39.4 and 88.1 %. The depth of loin lordosis has similar mean values as GKP: 0.01 and -7.51 mm, with the range in the first case from 0.0 to 5.6 mm, in the second from 0.0 to 30.8 mm. This means that there were also cases of loin lordosis depth's measurements in a slight inversion: GKP = 0.01 mm.

Coefficient and indices

The mean value of the compensation coefficient is: 7.87 and – 0.26, with min/max values respectively 0.0/32.1 and 0.0/23.0. This means that KLL assumed also values greater than KKP, which shows the occurring deepened loin lordosis. However, greater values of the chest kyphosis angle occurred more often.

Frontal plane – angular parameters

The mean value of the trunk bend to the right side angle is 0.28 degrees, with boundary values from 0.0 to 2.9 degrees, to the left side is 0.59 degrees, with a relatively great min/max range: 0.0/4.4 degrees. The shoulders line's angle assumed mean values 0.52 degrees when the left one was higher and 0.79 degrees when the right one was higher. Min/max values for the left shoulder are 0.0/7.0 degrees, for the right 0.0/5.7 degrees. In the case of the angle of the scapulas' inferior angles' line the mean value is 1.27 degrees when the angle of the left

scapula is higher and 0.95 degrees when the right one. The boundary values were respectively from 0.0 to 12.3 degrees for the left one and from 0.0 to 9.8 degrees for the right one. It should be observed that no simple interdependence occurs here: if the right shoulder is higher in relation to the left one, the right scapula does not have to follow it. The mean value of the right ilium's lowering angle is 0.45 degrees, of the left's 1.11, with min/max range respectively: 0.0/6.2 degrees and 0.0/12.2 degrees. It should be inferred that if unsymmetrical length of lower extremities occurs and the left one is shorter, the occurring difference is greater than if the right one were shorter.

Linear parameters

The mean value of the right shoulder's lowering in relation to the left one is 3.7 mm, and the left's in relation to the right is 2.43 mm, with a very great range of results, respectively from 0.0 to 26.5 mm and from 0.0 to 26.5 mm for the left one. The mean value of the right scapula's lowering in relation to the left one is 2.18 mm, and the left's in relation to the right one 2.89 mm, with boundary values as great as in the case of shoulders, respectively: from 0.0 to 28.5 mm and from 0.0 to 26.5 mm. The mean difference in the value of the distance of the right scapula in relation to the left one from the line of the backbone's spinous processes is 5.68 mm, and the left one is 2.53 mm, with a very great range of results for both scapulas from 0.0 to 43.8 mm. The mean percentage value of the difference in distance for the right one is 1.84 %, for the left 4.58 %, with an equally great range of extreme measurements, respectively: from 0.0 to 46.1 and from 0.0 to 40.2 % for the left one. It should be inferred that interdependence occurs here: if the right scapula is more distant from the backbone line than the left one, then the right shoulder is more protruding than the left one. The mean difference in the height of the right and left waist triangle is 6.64 mm when the left one is higher and 6.16 mm when the right one, with a very great range of min/max values: 0.0/92.3 in the case of the left one and 0.0/81.9 for the right one. The mean value of the difference in the triangles' width, in the case when the left one is wider, is 2.08 mm with extreme values from 0.0 to 27.3 mm, and when the right one 6.54 mm, with the range of results from 0.0 to 29.4 mm. Reversal of simple interdependence occurs here similarly as in the case of the shoulder and the scapula, when the left waist triangle is higher, it does not have to be also wider. The mean value of the maximum deviation to the left of the top vertebra of the spinous processes line's lateral bending from the perpendicular is 3.87 mm, to the right 1.31 mm, with great min/max values, respectively: 0.0/17.9 and 0.0/27 mm. The most deflected vertebra in the backbone line's lateral bending is most often the 9th thoracic vertebra.

Coefficients and indices

The mean value of the shoulders' asymmetry coefficient (WBS) for the situation in which the left shoulder is closer to the S1 axis is 5.84 with a very great range of results, because from 0.0 to 223.1, and the percentage value amounts to the level of 2.6 % with a rather narrow percentage range: from 0.0 to 20.8 %. When the right shoulder is closer, the coefficient is: 4.13 with extreme values from 0.0 to 42.0 and the percentage interpretation is only 1.54 % with the range from 0.0 to 14.1 %. The coefficient (WBC) of shoulders' asymmetry, in which the left shoulder is closer to the C7 axis is 2.11 with min/max values at the level 0.0/29.4 and the percentage value amounts to the level of 0.77 with the range of results from 0.0 to 9.5 %, and when the right one is closer, it is 4.53 with min/max respectively 0.0/31.5 and the percentage value 1.74 % with min/max values respectively 0.0/11.6 %. The coefficient (WBK) of shoulder-pelvis asymmetry in the vertical axis, in the situation in which the left shoulder is closer is 4.29 with the range of results from 0.0 to 32.6 and the percentage value amounts to the level of 0.73 % with the range from 0.0/10.1 %. When the right shoulder is closer, the coefficient is 2.21 with the range from 0.0 to 26.5 % and the percentage interpretation only 0.38 % with min/max respectively 0.0/5.3. The coefficient (WBX) of shoulder-pelvis asymmetry in the horizontal axis, in the situation in which the left shoulder is closer is 4.62 with min/max respectively: 0.0/39.9 and the percentage value is 2.38 % with 0.0/23.7 %. When the right shoulder is closer, the coefficient is 4.41 with extreme values from 0.0 to 33.6 and the percentage interpretation is 2.27 % with min/max respectively 0.0/15.4 %.

Transverse plane – angular parameters

The mean difference in the angles of inferior angles of the scapulas' protrusion from the surface of the back, in the situation when the right scapula's angle is more protruding is: 0.18 degrees with extreme values from 0.0 to 8.4 degrees and in the situation of a more protruding left angle of the scapula it is 3.21 degrees with min/max respectively 0.0/16.8 degrees. The mean value of the pelvis rotation to the left angle is 3.18 degrees with extreme measurements' results from 0.0 to 21.8, to the right 0.1 degrees with min/max respectively 0.0/7.1 degrees.

Linear parameters

The mean distance of the left scapula's inferior angle from the surface of the back in relation to the right angle, is 7.37 mm with boundary values from 0.0 to 31.8 mm, the mean distance of the right angle 0.34 degrees with a much smaller range of results 0.0 – 18.7 mm.

In kyphotic and equivalent type research, Śliwa and Chlebicka (2002) showed longer and more deepened chest kyphosis in Polish students than in Belgian students. In the lordotic type, Belgian students are characterized by more deepened chest kyphosis than Polish students. The authors believe that the shown differences are above all ethnic differentiation and higher physical fitness of Belgian students, resulting from a different profile of studies. Applicants to the professional military service do not depart considerably in their body posture from that presented by Belgian students.

Table 1.

Statistical description of features of the pelvis-backbone unit

N = 1802

Feature-Number	Feature	Unit	Mean value	Stand. dev.	Coeff. of var.	Min	Max
1	DCK	mm	354.91	110.41	31.11	258.8	440.3
2	DCK	%	20.19	2.18	10.84	10.3	49.4
3	Alfa	degrees	3.52	66.29	66.29	0.0	17.0
4	Beta	degrees	5.75	3.18	55.31	0.0	33.3
5	Gamma	degrees	12.28	3.89	31.7	3.1	78.3
6	Delta	degrees	23.2	6.53	28.16	0.0	45.0
7	KPT	degrees	0.18	0.67	357.8	0.0	6.5
8	KPT -	degrees	2.73	2.16	79.03	0.0	9.7
9	MI	degrees	7.87	5.29	67.28	0.0	32.1
10	MI -	degrees	0.26	1.48	566.52	0.0	23.0
11	DKP	mm	297.91	72.55	24.35	199.8	207.7
12	DKP	%	84.01	5.91	7.04	59.8	98.7
13	KKP	degrees	162.36	4.71	2.9	147.9	176.2
14	RKP	mm	228.74	69.63	30.44	130.5	145.7
15	RKP	%	64.18	6.51	10.15	44.8	83.3
16	GKP -	mm	0.01	0.44	2416.77	0.0	12.2
17	GKP	mm	10.37	5.9	56.86	0.0	32.7
18	WKP -	-	0.0	0.0	2469.42	0.0	0.007
19	WKP	-	0.0	0.0	62.31	0.0	0.3
20	DLL	mm	224.67	27.82	12.39	22.6	330.3
21	DLL	%	63.91	6.08	9.52	39.4	88.1
22	KLL	degrees	170.3	6.6	3.88	154.0	189.0
23	RLL	mm	125.63	24.12	19.2	50.9	208.0
24	RLL	%	36.3	12.96	35.72	16.7	342.3
25	GLL	mm	0.01	0.22	2056.42	0.0	5.6
26	GLL -	mm	7.51	5.53	73.59	0.0	30.8
27	WLL	-	0.0	0.0	2145.29	0.0	0.05
28	WLL -	-	0.05	0.04	71.84	0.0	0.1
29	KNT	degrees	0.28	0.52	186.63	0.0	2.9
30	KNT-	degrees	0.59	0.75	127.17	0.0	4.4

31	LBW	mm	3.7	5.45	147.24	0.0	26.5
32	LBW -	mm	2.43	4.28	175.58	0.0	28.5
33	KLB	degrees	0.52	0.91	175.25	0.0	7.0
34	KLB -	degrees	0.79	1.15	146.5	0.0	5.7
35	LŁW	mm	2.18	3.87	177.5	0.0	28.5
36	LŁW -	mm	2.89	4.41	152.51	0.0	26.5
37	UL	degrees	1.27	1.94	152.89	0.0	12.3
38	UL -	degrees	0.95	1.68	175.88	0.0	9.8
39	LŁB	mm	7.37	5.63	76.45	0.0	31.8
40	LŁB -	mm	0.34	1.63	475.16	0.0	18.7
41	UB	degrees	0.18	0.78	427.51	0.0	8.4
42	UB -	degrees	3.21	2.46	76.83	0.0	16.8
43	OL	mm	2.53	4.81	189.99	0.0	43.8
44	OL -	mm	5.68	6.96	122.51	0.0	43.8
45	OL	%	1.87	3.73	199.12	0.0	46.1
46	OL -	%	4.58	5.71	124.7	0.0	40.2
47	TT	mm	6.64	11.71	176.36	0.0	92.3
48	TT -	mm	6.16	11.47	186.09	0.0	81.9
49	TS	mm	2.08	4.55	218.71	0.0	27.3
50	TS -	mm	6.54	7.01	107.21	0.0	29.4
51	KNM	mm	1.11	1.71	153.3	0.0	12.2
52	KNM -	mm	0.45	1.09	242.33	0.0	6.2
53	KSM -	degrees	3.81	2.55	66.89	0.0	21.8
54	KSM	degrees	0.1	0.6	592.85	0.0	7.1
55	WBS	-	5.84	11.12	190.33	0.0	223.1
56	WBS -	-	4.13	6.72	162.81	0.0	42.0
57	WBS	%	2.06	2.96	143.36	0.0	20.8
58	WBS -	%	1.54	2.54	164.97	0.0	14.1
59	WBC	-	2.11	4.31	204.32	0.0	29.4
60	WBC -	-	4.53	5.75	126.86	0.0	31.5
61	WBC	%	0.77	1.56	202.6	0.0	9.5
62	WBC -	%	1.74	2.22	127.5	0.0	11.6
63	WBK	-	4.29	5.87	136.73	0.0	32.6
64	WBK -	-	2.21	4.06	183.68	0.0	26.5
65	WBK	%	0.73	1.07	145.85	0.0	10.1
66	WBK -	%	0.38	0.71	186.47	0.0	5.3
67	WBX	-	4.62	6.98	150.85	0.0	39.9
68	WBX -	-	4.41	6.66	151.01	0.0	33.6
69	WBX	%	2.38	3.66	153.5	0.0	23.7
70	WBX -	%	2.27	3.41	150.04	0.0	15.4
71	UK -	mm	3.87	3.59	92.8	0.0	17.9
72	UK	mm	1.31	2.47	188.39	0.0	27.0
73	No. of vertebra	-	16.35	3.73	22.86	0.0	23

CONCLUSIONS

The typical body posture of the examined candidates to the professional military service is characterized by: a slightly bent trunk and the pelvis moderately rotated to the left, moderately deepened chest kyphosis and considerably deepened loin lordosis, a very protruding right angle of the scapula, great asymmetry of waist triangles: the right one is higher and wider, moderate shoulder asymmetry, the right one is higher, the backbone protruding most often to the left and the peak at the height of the 9th thoracic vertebra.

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