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Morphological Characteristics of Members of the Montenegro Armed Forces: Differences Across Service Branches

Características Morfológicas de los Miembros de las Fuerzas Armadas de Montenegro: Diferencias Entre las Ramas del Servicio

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SUMMARY: Previous research in military medicine, anthropometry, and kinesiology has demonstrated substantial variation in morphological characteristics and body composition among military personnel, reflecting differences in age, occupational demands, training requirements, and service-specific roles. The present study aimed to assess morphological characteristics and examine differences among members of the Montenegro Armed Forces across three service branches. The sample comprised 240 active-duty military personnel, equally distributed across three groups (n = 80 per group): Navy (38.1 ± 6.0 years), Air Force (38.0 ± 5.0 years), and Ground Forces (36.1 ± 7.0 years). The anthropometric assessment included measures of longitudinal dimensions, transverse dimensions, body mass and volume, subcutaneous adiposity, and body composition. Descriptive statistics were calculated for all variables. Differences among the three groups were examined using multivariate analysis of variance (MANOVA), followed by univariate analysis of variance (ANOVA) and Tukey's post hoc test where appropriate. The MANOVA indicated statistically significant differences in the overall morphological profile among the three service branches. Subsequent univariate analyses identified seven variables that contributed significantly to the observed between-group differences: body height, shoulder breadth, waist circumference, abdominal skinfold thickness, thoracic skinfold thickness, body fat percentage, and waist-to-hip ratio. These findings indicate that members of different service branches of the Montenegro Armed Forces exhibit distinct morphological and body-composition profiles. The observed differences may be associated with a combination of demographic, occupational, training-related, and anthropometric factors; however, the cross-sectional design does not permit causal inferences regarding the mechanisms underlying these differences. Future research should incorporate larger samples and stratified analyses by age, rank, military specialty, training history, and occupational demands to provide a more comprehensive understanding of morphological variation within the Montenegro Armed Forces.

KEY WORDS: Anthropometry; Body composition; Morphological characteristics; Military personnel; Armed forces; Montenegro; Service branches.

INTRODUCTION

Despite substantial advances in military technology and the increasing reliance on sophisticated weapon systems and other technological resources, human performance remains a critical component of national defense. The physical characteristics and functional capacities of military personnel, including morphological characteristics, motor abilities, and physiological capabilities, are closely related to their ability to perform routine and operational tasks under physically demanding conditions (Maric *et al*., 2013). Consequently, the assessment and monitoring of anthropometric characteristics and body composition remain important components of personnel selection, military training, and the maintenance of operational readiness.

Among the morphological characteristics relevant to military populations, excessive body mass and adiposity have received particular attention. The prevalence of overweight and excess body fat among military personnel represents an important concern because unfavorable body composition may compromise physical performance and may be associated with an increased risk of metabolic, cardiovascular, and musculoskeletal disorders (Crawford *et al*., 2011; Kyrolainen *et al*., 2008). In addition, excessive adiposity may adversely affect the ability to perform physically demanding military tasks, particularly those requiring prolonged exertion, mobility while carrying external loads, and repeated high-intensity activities.

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Accordingly, maintaining an appropriate body composition should be considered an integral component of military readiness rather than solely a health-related outcome.

Anthropometric characteristics provide important information about body size, body proportions, and body composition and can therefore complement conventional measures of physical fitness (Jukic *et al*., 2008). Although physical fitness tests provide valuable information regarding an individual's current functional capacity, they do not fully capture all factors that may influence the ability to perform specific military duties. In particular, body mass and body composition may affect locomotion, load carriage, endurance, and the mechanical demands imposed on the musculoskeletal system. An unfavorable body composition may also represent an additional risk factor for cardiovascular and musculoskeletal morbidity, particularly when combined with the high physical demands characteristic of military occupations. For these reasons, anthropometric and body-composition standards have traditionally been considered complementary to physical fitness standards in the assessment of military personnel (Vogel & Friedl, 1990).

The morphological profile of military personnel may also vary according to the operational characteristics and occupational demands of individual service branches. Different military environments, including land, maritime, and airborne settings, impose specific physical and occupational requirements and involve the use of different weapon systems, vehicles, equipment, and operational procedures. Personnel assigned to ground, naval, and air forces may therefore be exposed to different patterns of physical activity, occupational loading, training, and task-specific demands. At the same time, military organizations share a number of common occupational structures, including command and administrative functions, logistics, communications, security, and other support services. Consequently, differences between service branches cannot necessarily be attributed solely to their operational environment, and the morphological characteristics of military personnel should be considered within the broader context of occupational specialization and individual characteristics (Banjevic, 2021).

Previous studies have examined morphological characteristics and body composition in military populations from different countries and service contexts (Marriott & Grumstrup-Scott, 1990, 1992; Collins *et al*., 1995; Harik-Khan *et al*., 2001; Babcock *et al*., 2006; Lucic & Aracic, 2008; Jukic *et al*., 2008; Maric & Krsmanovic, 2010; Banjevic, 2012; Abt *et al*., 2016). Collectively, these studies suggest that morphological profiles may vary according to demographic characteristics, age, occupational specialization, training requirements, and the specific organizational and operational characteristics of military units. Differences related to geographical and population characteristics have also been reported, indicating that anthropometric reference values derived from one military population may not necessarily be directly applicable to another.

Despite the existing body of evidence, comparative information on the morphological characteristics and body composition of military personnel across different service branches within the Montenegro Armed Forces remains limited. This is particularly relevant because personnel serving in the Navy, Air Force, and Ground Forces may differ in occupational demands, training environments, and task-specific requirements. Establishing whether systematic differences exist among these groups may provide useful information for the assessment of current anthropometric status and may contribute to the development or refinement of service-specific approaches to personnel assessment and physical readiness.

Therefore, the aim of the present study was to assess morphological characteristics and examine differences in anthropometric and body-composition variables among members of three service branches of the Montenegro Armed Forces: Navy, Air Force, and Ground Forces. By identifying variables that distinguish these groups, the study sought to provide a more comprehensive description of the morphological profile of military personnel and to establish a basis for future research examining the relationships between anthropometric characteristics, age, military specialty, training history, and occupational demands.

MATERIAL AND METHOD

The present study employed a cross-sectional design based on a single assessment of selected morphological and body-composition characteristics of active-duty military personnel serving in the Montenegro Armed Forces.

The study sample comprised 240 military personnel, equally distributed across three service branches (n = 80 per group): Navy, Air Force, and Ground Forces. The mean age of participants was 38.1 ± 6.0 years in the Navy, 38.0 ± 5.0 years in the Air Force, and 36.1 ± 7.0 years in the Ground Forces.

The evaluation of the morphological characteristics was carried out based on the measurements, calculations, and analysis of the following anthropometric indicators: body height, arm length, leg length, foot length, shoulder width, hip width, foot width, knee diameter, body mass, waist circumference, hip circumference, thoracic

circumference, abdominal skinfolds, thoracic skinfolds, upper leg skinfolds, upper arm skinfolds, the body mass index, body density, percentage of body fat, and the waist/hip ratio coefficient. Measurements of the morphological characteristics were carried out in accordance with the Protocol for the morphological diagnostics of soldiers (Jukic *et al*., 2008), while the calculation of the parameters of body composition was carried out according to the protocols given in the Handbook of physical fitness related to health (Kaminsky, 2013).

The obtained results were first coded, and then statistically processed on a PC using the SPSS 20.0 statistical package. For all the applied indicators of morphological status the descriptive statistical parameters of central tendency were calculated: minimum results, maximum results and arithmetic mean. In order to analize potential differences in the space of morphological status between the subsamples of examinees, a multivariate analysis of variance (MANOVA) has been conducted, while in the second step, in order to determine the differences between the groups according single variables, the univariate analysis of variance (ANOVA) has been applied. In order to determine the real source of variance among the groups, in a further analysis the procedure has been conducted by which single differences are tested between each of the calculated arithmetic mean, i.e. classic analysis of variance (F-test) has been supplemented by post hoc test with Tukey's model to determine differences (Tukey's Honestly Significant Difference test-HSD). The realized significance level for previously stated statistical procedures is $p \leq 0.05$.

RESULTS

Table I shows the basic statistical descriptive parameters of the morphological characteristics of members of the AF of Montenegro.

By testing significant differences of all morphological variables between the subsamples of examinees compared to the constituent parts of the army using multivariate analysis of variance (MANOVA), a statistically significant difference was established, since the value of Wilks Lambda amounted to 0.562, which, with an F value of 3.45, indicates a statistically significant difference ($P < 0.001$).

In order to establish in which variables this difference exists, the univariate analysis of variance has been calculated for each morphological variable (Table II).

By looking at Table II we can conclude that 7 morphologic variables contribute to differing the subsamples of examinees. Those are: body height, shoulder width, waist circumference, abdominal skinfold, thoracic skinfold, percentage of body fat and waist to hip ratio.

Based on the results of Tukey's test for the variable body height, it was established that a statistically significant difference was observed between Navy seamen (179.6) and Air Forces airmen (182.3; $P = 0.023$). No statistically significant differences were found between the other groups ($P > 0.05$).

Based on the results of Tukey's test for the variable shoulder width, statistically significant differences were established between Navy seamen (43.8) and Air Forces airmen (45.2; $P = 0.011$), as well as between Ground Forces soldiers (44.0) and Air Forces airmen (45.2; $P = 0.042$). No statistically significant difference was observed between Navy seamen and Ground Forces soldiers ($P = 0.876$).

Based on the results of Tukey's test for the variable waist circumference, a statistically significant difference was established between Ground Forces soldiers (93.0) and Air Forces airmen (97.4; $P = 0.009$). No statistically significant differences were observed between the other groups ($P > 0.05$).

Based on the results of Tukey's test for the variable abdominal skinfold, a statistically significant difference was established between Ground Forces soldiers (21.4) and Air Forces airmen (27.5; $P = 0.001$). No statistically significant differences were observed between the other groups ($P > 0.05$).

Based on the results of Tukey's test for the variable thoracic skinfold, a statistically significant difference was established between Navy seamen (5.0) and Air Forces airmen (5.9; $P = 0.004$). No statistically significant differences were observed between the other groups ($P > 0.05$).

Based on the results of Tukey's test for the variable percentage of body fat, a statistically significant difference was established between Ground Forces soldiers (10.16) and Air Forces airmen (12.99; $P < 0.001$). No statistically significant differences were observed between the other groups ($P > 0.05$).

Based on the results of Tukey's test for the variable waist to hip ratio, statistically significant differences were established between Navy seamen (1.01) and Ground Forces soldiers (0.99; $P = 0.019$), as well as between Ground Forces soldiers (0.99) and Air Forces airmen (1.02; $P = 0.001$). No statistically significant difference was observed between Navy seamen and Air Forces airmen ($P = 0.629$).

Table I. The central parameters of the variables of morphological characteristics of members of the AF of Montenegro.

Part of the Army	**Navy**			**Air Forces**			**Ground Forces**		
Variables	**Min**	**Max**	**M**	**Min**	**Max**	**M**	**Min**	**Max**	**M**
Body height	169.0	193.3	179.6	169.5	197.0	182.3	166.5	196.7	181.5
Arm length	72.5	88.4	79.8	74.2	88.3	80.6	74.1	86.1	80.5
Leg length	96.1	111.5	103.8	80.1	118.5	105.1	93.6	117.0	105.4
Foot length	24.2	30.5	26.7	24.8	31.2	27.0	24.2	29.7	26.8
Shoulder width	37.0	49.6	43.8	39.9	51.5	45.2	37.0	51.0	44.0
Hip width	29.6	39.5	33.2	27.5	42.9	33.0	29.5	43.2	33.6
Foot width	8.3	12.0	9.6	8.6	11.2	9.6	8.4	11.0	9.6
Knee diameter	8.0	11.9	9.9	8.0	12.5	9.8	8.2	11.9	10.1
Body mass	68.6	146.0	90.6	65.9	135.3	93.4	67.7	132.8	90.8
Waist circumference	77.0	140.0	96.2	73.5	126.0	97.4	77.2	122.0	93.0
Hip circumference	83.0	130.0	93.8	74.5	122.0	94.5	78.0	114.3	92.7
Thoracic circumference	82.0	124.5	105.5	90.9	130.0	106.3	83.1	134.1	104.2
Abdominal skinfold	6	60	24.6	5	60	27.5	9	55	21.4
Thoracic skinfold	2	10	5.0	3	16	5.9	3	10	5.2
Upper leg skinfold	3	13	6.6	3	14	6.9	4	14	6.5
Upper arm skinfold	3	13	7.6	4	15	8.5	3	14	8.1
Body mass index	21.88	41.83	28.12	21.62	37.22	28.26	20.80	37.12	27.52
Body density	1.04	1.09	1.06	1.04	1.97	1.07	1.04	1.09	1.07
Percentage of body fat	2.55	22.16	11.51	.64	22.70	12.99	2.66	21.45	10.16
Waist to hip ratio	.92	1.12	1.01	.93	1.15	1.02	.91	1.12	.99

Legend: Min – minimum result; Max – maximum result; M – arithmetic mean.

Table II. ANOVA morphological characteristics of members of the AF of Montenegro.

	F	**p**
Body height	3.68	**.027**
Arm length	1.48	.228
Leg length	2.68	.070
Foot length	.92	.399
Shoulder width	4.88	**.008**
Hip width	1.24	.289
Foot width	.08	.923
Knee diameter	1.45	.623
Body mass	1.21	.298
Waist circumference	4.67	**.010**
Hip circumference	1.28	.280
Thoracic	1.49	.227
Abdominal skinfold	6.69	**.001**
Thoracic skinfold	5.56	**.004**
Upper leg skinfold	.65	.521
Upper arm skinfold	2.15	.118
Body mass index	1.11	.330
Body density	.32	.725
Percentage of body	8.94	**.000**
Waist to hip ratio	7.15	**.001**

DISCUSSION

The present study identified statistically significant differences among the three service branches of the Montenegro Armed Forces in seven morphological and body-composition variables: body height, shoulder breadth, waist circumference, abdominal skinfold thickness, thoracic skinfold thickness, percentage body fat, and waist-to-hip ratio. The observed differences indicate that military personnel assigned to different service branches may exhibit distinct morphological profiles. However, given the cross-sectional design of the study and the absence of detailed stratification according to military specialty, age, training history, and occupational exposure, the observed differences should be interpreted as between-group associations rather than as evidence of causal effects of military service.

Body height is an important anthropometric characteristic because it contributes substantially to overall body dimensions and proportions. In the present study, Air Force personnel were, on average, 2.7 cm taller than Navy personnel, and this difference was statistically significant. Because the comparison involved broad service branches rather than highly specific occupational specialties (e.g., pilots, naval commandos, or divers), a direct functional explanation for this finding cannot be established from the available data. One possible explanation may relate to differences in the geographical and population background of the participants. According

to the available information on place of birth and family origin, approximately 73 % of the Air Force personnel included in the present sample originated from the Dinaric region of Montenegro. Previous anthropometric research has reported particularly high mean stature among populations inhabiting the Dinaric Alps and surrounding regions (Pineau *et al*., 2005). Therefore, differences in population background may represent one potential contributing factor to the observed difference in body height. Nevertheless, this interpretation should be regarded as a hypothesis requiring direct verification in future studies, because the present study did not systematically assess ancestry, parental stature, socioeconomic background, or other determinants of adult height.

A statistically significant difference was also observed in shoulder breadth. Air Force personnel exhibited greater mean shoulder breadth than both Navy personnel (by 1.4 cm) and Ground Forces personnel (by 1.2 cm). Despite these between-group differences, the Brugsch index (I = shoulder breadth/body height × 100) exceeded 24 in all three groups, indicating a relatively broad-shouldered body configuration according to the classification proposed by Obradovic (1998). Shoulder breadth reflects the transverse dimensions of the upper trunk and is influenced by the skeletal structures of the shoulder girdle, particularly the clavicles and scapulae, as well as the morphology of the shoulder region. The functional organization of this region enables a large range of movement of the upper extremities through coordinated movements of the clavicle, scapula, and humerus (Behnke, 2014). From a military perspective, adequate development and functional capacity of the shoulder complex may be relevant to activities requiring controlled and precise upper-limb movements, including weapon handling and manipulation of military equipment. However, the present study did not directly assess upper-limb mobility, muscular strength, or weapon-handling performance; therefore, the functional implications of the observed differences in shoulder breadth remain speculative. The association between greater transverse skeletal dimensions and an athletic body configuration has previously been discussed in anthropometric research (Medved *et al*., 1979), although such morphological characteristics should not be interpreted as direct indicators of physical performance in the absence of corresponding functional measurements.

Significant between-group differences were also observed for waist circumference, abdominal skinfold thickness, and percentage body fat, with higher mean values in Air Force personnel than in Ground Forces personnel by 4.4 cm, 6.1 mm, and 2.83 percentage points, respectively. One possible explanation for this pattern may be differences in the physical demands and training environments associated with specific military occupations. Ground Forces personnel, particularly those involved in infantry-related activities, may be exposed to relatively high volumes of locomotor and load-bearing activity during training and routine duties. Such activities may include obstacle-course training, climbing, skiing, mountaineering, loaded marches, weapons training, and tactical exercises. In contrast, some occupational positions within the Air Force, particularly those involving aircraft technical maintenance and airspace observation, may involve greater proportions of sedentary or static work. These differences in occupational exposure could potentially contribute to variation in habitual physical activity and energy expenditure.

Nevertheless, the present study did not quantify daily physical activity, training volume, energy expenditure, dietary intake, or occupational workload. Therefore, the observed differences in waist circumference, abdominal skinfold thickness, and percentage body fat cannot be attributed directly to differences in military training or occupational activity. Rather, the findings suggest that occupational and training characteristics should be considered in future research as potentially relevant factors associated with body-composition differences among service branches.

This interpretation is consistent with the broader concept that military personnel should not necessarily be evaluated using identical physical-fitness and morphological criteria regardless of occupational specialization. Different military tasks require different combinations of physical capacities, and the dominant movement patterns and energetic demands may vary substantially between occupational groups (Jukic *et al*., 2008). Previous research conducted among personnel of the Montenegro Armed Forces has similarly indicated that performance in a complex motor-cognitive task simulating movement demands relevant to Air Force personnel was associated with several physical characteristics, including speed, coordination, anaerobic endurance, explosive strength of the lower extremities, body mass, and forearm circumference (Banjevic, 2012). These findings support the need to consider occupational specificity when developing physical-fitness assessment protocols and training programs for military personnel. Rather than assuming that a single battery of tests adequately represents the requirements of all military occupations, future research should investigate whether occupation-specific assessment batteries provide a more valid representation of operationally relevant physical capacities.

A statistically significant difference was also observed in thoracic skinfold thickness, with Air Force personnel exhibiting a mean value 0.9 mm higher than Navy

personnel. Because percentage body fat was also higher in Air Force personnel, the difference in thoracic skinfold thickness is broadly consistent with the overall between-group difference in adiposity. However, the precise interpretation of an individual skinfold measurement should be approached cautiously because skinfold thickness reflects localized subcutaneous adipose tissue and is influenced by the anatomical site and measurement technique. According to the anthropometric protocol used in the present study, the thoracic skinfold is measured over the pectoral region (Jukic *et al.*, 2008). The pectoral musculature contributes to movements of the upper extremity, including flexion, adduction, and internal rotation of the arm (Behnke, 2014). Although these functions are relevant to numerous military activities, the present data does not permit the observed difference in thoracic skinfold thickness to be interpreted as evidence of differences in pectoral-muscle use or muscular development between service branches. In particular, the proposed association with swimming, diving, obstacle negotiation, shipboard activities, and load carriage among Navy personnel would require direct measurement of occupational exposure and training volume before such an explanation could be supported. The most defensible interpretation of the present finding is therefore, that the difference in thoracic skinfold thickness forms part of the broader between-group variation in adiposity observed in the study.

The observed differences in waist-to-hip ratio (WHR) should likewise be interpreted within the broader context of body-fat distribution. WHR provides an index of the proportional relationship between waist and hip circumferences, but an isolated difference in this ratio is insufficient to determine the precise pattern of regional adipose tissue deposition. In the present sample, the Ground Forces group exhibited a WHR below 1.0, indicating a lower waist-to-hip ratio than that observed in the other two service branches. Although this may represent a more favorable distribution of these anthropometric dimensions, the present cross-sectional data does not allow conclusions regarding the effects of future training-induced changes in body composition. In particular, a proposed reduction toward a specific threshold such as 0.95 should not be presented as an expected outcome without longitudinal evidence demonstrating such a training response. Future intervention studies could determine whether structured and occupation-specific physical training produces meaningful changes in waist circumference, hip circumference, WHR, and other indicators of adiposity.

Overall, the findings of the present study contribute to the characterization of morphological and body-composition profiles among members of the Montenegro Armed Forces and provide evidence that measurable differences exist among personnel assigned to different service branches. The findings also highlight the importance of considering occupational specificity when interpreting anthropometric characteristics in military populations. At the same time, several limitations should be acknowledged. The cross-sectional design precludes causal inference, while the relatively broad classification by service branch may conceal substantial heterogeneity among individual military specialties. In addition, potentially relevant determinants of morphological characteristics, including age, rank, military specialty, training history, habitual physical activity, dietary intake, and occupational workload, were not incorporated into the present analysis. The sample was also limited to personnel of the Montenegro Armed Forces, which may restrict the generalizability of the findings to other military populations.

Future studies should therefore employ larger and more heterogeneous samples and incorporate stratified analyses according to age, sex where applicable, rank, military specialty, training history, and occupational demands. Longitudinal and intervention-based designs would be particularly valuable for determining whether differences in training exposure and occupational activity are associated with changes in body composition and other morphological characteristics over time. In addition, integrating anthropometric assessment with objective measures of physical fitness, habitual physical activity, energy expenditure, and occupational workload could provide a more comprehensive basis for developing occupation-specific physical-fitness standards and training programs within the Montenegro Armed Forces.

Conflict of interest. The authors declare no conflict of interest.

BANJEVIC, B.; NOKIC, A. & PETKOVIC, J. Características morfológicas de los miembros de las fuerzas armadas de Montenegro: Diferencias entre las ramas del servicio. Int. J. Morphol., 44(4):1469-1475, 2026.

RESUMEN: Investigaciones previas en medicina militar, antropometría y kinesiología han demostrado una variación sustancial en las características morfológicas y la composición corporal del personal militar, reflejando diferencias en edad, exigencias laborales, requisitos de entrenamiento y funciones específicas de cada servicio. El presente estudio tuvo como objetivo evaluar las características morfológicas y examinar las diferencias entre los miembros de las Fuerzas Armadas de Montenegro pertenecientes a tres ramas del servicio. La muestra estuvo compuesta por 240 militares en servicio activo, distribuidos equitativamente en tres grupos (n = 80 por grupo): Armada (38,1 ± 6,0 años), Fuerza Aérea (38,0 ± 5,0 años) y Fuerzas Terrestres (36,1 ± 7,0 años). La evaluación antropométrica incluyó mediciones de

dimensiones longitudinales y transversales, masa y volumen corporal, adiposidad subcutánea y composición corporal. Se calcularon estadísticas descriptivas para todas las variables. Las diferencias entre los tres grupos se examinaron mediante un análisis de varianza multivariante (MANOVA), seguido de un análisis de varianza univariante (ANOVA) y la prueba post hoc de Tukey cuando correspondía. El MANOVA indicó diferencias estadísticamente significativas en el perfil morfológico general entre las tres ramas del servicio. Los análisis univariantes posteriores identificaron siete variables que contribuyeron significativamente a las diferencias observadas entre grupos: estatura, anchura de hombros, circunferencia de cintura, grosor del pliegue cutáneo abdominal, grosor del pliegue cutáneo torácico, porcentaje de grasa corporal e índice cintura-cadera. Estos hallazgos indican que los miembros de las diferentes ramas de las Fuerzas Armadas de Montenegro presentan perfiles morfológicos y de composición corporal distintos. Las diferencias observadas pueden asociarse a una combinación de factores demográficos, laborales, relacionados con el entrenamiento y antropométricos; sin embargo, el diseño transversal no permite establecer inferencias causales sobre los mecanismos subyacentes a estas diferencias. Futuras investigaciones deberían incorporar muestras de mayor tamaño y análisis estratificados por edad, rango, especialidad militar, historial de entrenamiento y exigencias laborales, con el fin de ofrecer una comprensión más completa de la variación morfológica dentro de las Fuerzas Armadas de Montenegro.

PALABRAS CLAVE: Antropometría; Composición corporal; Características morfológicas; Personal militar; Fuerzas armadas; Montenegro; Ramas de las fuerzas armadas.

REFERENCES

Abt, J. P.; Perlsweig, K.; Nagai, T.; Sell, T. C.; Wirt, M. D. & Lephart, S. M. Effects of age and military service on strength and physiological characteristics of U.S. Army soldiers. *Mil. Med., 181(2)*:173-9, 2016.

Babcock, C. J.; Kirby, T. E.; McCarroll, M. L. & Devor, S. T. A comparison of military circumference equations to skinfold-based equations to estimate body composition. *Mil. Med., 171(1)*:60-3, 2006.

Banjevic, B. *Model value of motor ability and morphological status of Montenegro Army Air Base employees and its influence on the complex motor activities.* Master's Thesis. Podgorica, University of Montenegro, 2012.

Banjevic, B. *Specificities of morphological characteristics and functional abilities of the members of Montenegro Armed Forces with reference to age, branch of service and military specialty*. Ph.D. Dissertation. Niksic, University of Montenegro, 2021.

Behnke, R. *Kinesiological Anatomy*. Belgrade, Data Status, 2014.

Collins, L. C.; Hoberty, P. D.; Walker, J. F.; Fletcher, E. C. & Peiris, A. N. The effect of body fat distribution on pulmonary function tests. *Chest, 107(5)*:1298-302, 1995.

Crawford, K.; Fleishman, K.; Abt, J. P.; Sell, T. C.; Lovalekar, M.; Nagai, T.; Deluzio, J.; Rowe, R. S.; McGrail, M. A. & Lephart, S. M. Less body fat improves physical and physiological performance in army soldiers. *Mil. Med., 176(1)*:35-43, 2011.

Harik-Khan, R. I.; Wise, R. A. & Fleg, J. L. The effect of gender on the relationship between body fat distribution and lung function. *J. Clin. Epidemiol., 54(4)*:399-406, 2001.

Jukic, I.; Vucetic, V.; Aracic, M.; Bok, D.; Dizdar, D.; Sporis, G. & Krizanic, A. *Dijagnostika kondicijske pripremljenosti vojnika: osnove dijagnostickih postupaka za pracenje i provjeravanje te kontrolu razine treniranosti vojnika*. Zagreb, 2008.

Kaminsky, A. *Handbook of Physical Fitness Related to Health*. Belgrade, Data Status, 2013.

Kyrolainen, H.; Hakkinen, K.; Kautiainen, H.; Santtila, M.; Pihlainen, K. & Hakkinen, A. Physical fitness, BMI and sickness absence in male military personnel. *Occup. Med. (Lond.), 58(4)*:251-6, 2008.

Lukic, J. & Aracic, M. *Differences of the morphological characteristics of the members of the Croatian Armed Forces*. In: Proceedings of the 5th International Scientific Conference on Kinesiology. Zagreb, Faculty of Kinesiology, University of Zagreb, 2008. pp.387-91.

Maric, L. & Krsmanovic, B. Differences in the anthropometric characteristics of students of the Military Academy during their education. *Glas. Antropol. Drus. Srb., 45*:349-55, 2010.

Maric, L.; Krsmanovic, B.; Mraovic, T.; Gogic, A.; Sente, J. & Smajic, M. The effectiveness of physical education of the military academy cadets during a 4-year study. *Vojnosanit. Pregl., 70(1)*:16-20, 2013.

Marriott, B. M. & Grumstrup-Scott, J. (Eds.). *Body Composition and Physical Performance: Applications for the Military Services*. Washington, DC, National Academy Press, 1990.

Medved, R.; Heimer, S.; Kesic, B. & Pavisic-Medved, V. *Sports Medicine.* Zagreb, Yugoslav Medical Book, 1979.

Obradovic, D. *Human Anatomy*. Novi Sad, ITP Zmaj, 1998.

Pineau, J. C.; Delamarche, P. & Bozinovic, S. Les Alpes Dinariques: un peuple de sujets de grande taille. *C. R. Biol., 328(9)*:841-6, 2005.

Vogel, J. A. & Friedl, K. E. *Army data: Body composition and physical capacity*. In: Marriott, B. M. & Grumstrup-Scott, J. (Eds.). Body Composition and Physical Performance: Applications for the Military Services. Washington, DC, National Academy Press, 1990. pp.89-103.

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