

## REFERENT VALUES OF SOME FACTOR MOST VALUED ANTHROPOMETRIC AND MOTOR VARIABLES OF THE KARATEISTS

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(Note)

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*The purpose of the research was to deter the referent values of some manifest anthropometric measures and motor test based on their highest level of validity, which is result of their factorization in the Macedonian karate selection. The research is realized on 30 respondents (karateists) on aged from 16 to 27 years. On the respondents were applied 64 anthropometric measures and motor tests. Of these were: 17 anthropometric measures, 27 basic motor test and 20 specific motor tests. After factorization of all anthropometric measures and motor test, from them were selected 14 anthropometric measures and motor tests with highest level of validity. On those measures and tests were determined the minimal and maximal manifest results. On that way, is possible to classify any potential karateist or karateist who is longer included in the training process and karate-competitions.*

**Keywords:** *testing, basic motor tests, specific motor tests, factor analysis*

**INTRODUCTION**

The establishment of reference values of karateists in the most valued factor variables for assessing the anthropological status is significant question, because those values may be used as a model of respondents behavior who are already involved and train the karate sport. On that way it would be possible to determinate the level of the anthropometric and motor condition of the respondent, is he on average level, under average or above average. In that case, Because of that, the purpose of this research is to contribute in that direction.

**METHODS**

The example of respondents is consisted from 30 internationals, top karateists involved in a wider range of Macedonian karate team. They have actively exercise at least 5 years and at least have won the I to III-place in kumite fights on national level in their categories. The respondents were grouped into joint group from juniors and seniors on age from 16 to 27 years. Respondents were selected by the selectors of junior and senior national team of Macedonia.

On the respondents were applied 64 anthropometric measurements and motor (basic and specific) tests:

**Anthropometric measurements:**

1. *Assessment of longitudinal dimension of the skeleton:* Height of the body (AVNT), length of hand (ADNR), length of leg (ADNN), length of foot (ADNS), range of hand (ARNS).
2. *Assessment of transversal dimension of the skeleton:* diameter of the hand' wrist (ADRZ), diameter of knee (ADNK) diameter of the elbow (ADNL), diameter of the ankle joint (ADNSZ).
3. *Assessment of the volume and mass of the body:* weight of the body (ATNT), volume of chest (AOGK), volume upper knee (AONK), volume of upper arm (AONL).
4. *Assessment of subcutaneous adipose tissue:* fold of belly skin (AKNM), skin fold on the back (AKNG), the upper arm skin fold (AKNN) skin fold of under knee (AKNPK)

**Basic motor tests:**

*For assessing the coordination:*

1. Infiltration and skipping (MPIP)
2. Jumping in distance backwards (MSDN)
3. Side Steps

(MSTC), 4. 20 - Making a step with insertion (M20ISP), 5. Climbing and descending on stairs backwards (MKSSN).

*For assessing the explosive power:*

1. Throwing medical ball with the hands from lying position on back to the front (MFMRLGKN)
2. Throwing sack from lying position to back with

legs (MIVLGKNN),

3. Throwing a bag in front with legs by reliance caught on wall bars (MOPSIVKNFR)

4. Running of 20m standing start (MT20M)

5. Jumping in distance of place (MSDM)

6. Triple jump (MTOM)

*Table 1. Basic statistical parameters of the anthropometric measures*

Variables	Mean	Minimum	Maximum	Std.Dev.	Skewness	Kurtosis
AVNT	176,47	161,0	186,0	5,89	-,36	,08
ADNR	75,66	68,6	89,0	3,85	1,14	3,85
ADNN	102,50	87,0	111,0	6,01	-,90	,48
ADNS	28,39	21,1	30,0	2,99	-,42	,37
ARNS	21,65	18,0	25,0	1,59	,46	,65
ADRZ	6,24	4,70	9,90	1,23	1,67	3,73
ADNK	10,74	8,90	12,5	1,22	,02	-1,60
ADNL	7,38	6,10	9,90	,86	,67	,90
ADNSZ	7,44	6,10	8,70	,85	-,14	-1,67
ATNT	74,97	52,0	93,0	9,77	-,25	-,27
AOGK	84,97	57,0	99,0	9,05	-1,13	2,37
AONK	48,43	35,0	56,0	4,45	-,65	1,65
AONL	26,03	21,0	32,0	2,92	-,07	-,40
AKNM	14,06	8,20	24,8	4,53	,79	-,16
AKNG	12,08	7,20	24,0	3,77	1,83	3,76
AKNN	13,13	7,00	23,6	3,87	,75	,40
AKNPK	9,73	5,40	18,4	3,16	,79	,49

*Table 2. Basic statistical parameters in the basic motor tests*

Variables	Mean	Minimum	Maximum	Std.Dev.	Skewness	Kurtosis
MPIP	19,23	12,90	25,00	2,19	,23	2,77
MSDN	105,97	72,00	132,00	15,04	-,50	-,35
MSTC	20,92	14,60	31,20	4,00	,75	,22
M20ISP	19,29	13,50	29,70	4,46	,91	,14
MKSSN	5,15	3,20	11,30	1,95	1,91	3,58
MFMRLGKN	1014,63	589,00	1400,00	217,34	,05	-1,01
MIVLGKNN	371,73	130,00	705,00	159,54	,38	-1,07
MOPSIVNK	466,77	282,00	710,00	99,08	,33	,15
MT20M	3,64	2,90	4,31	,31	-,33	,20
MSDM	221,97	180,00	260,00	15,11	-,74	2,98
MTOM	624,77	520,00	695,00	46,12	-,55	-,57
MPNLG	29,80	17,00	40,00	5,82	-,54	-,30
MSKP	35,80	14,00	70,00	12,49	,53	,70
MZNVF	12,23	6,00	27,00	4,98	1,09	1,18
MPT30	27,20	15,00	46,00	7,57	1,09	1,19
MVZNH	25,45	7,00	57,10	12,68	,64	-,01
MVZPH	34,97	11,60	65,00	13,96	,09	-,89
MIZGRAD	63,13	31,00	120,00	22,56	1,00	1,14
MIZGRB	47,87	10,00	92,00	23,68	,27	-,67
MTAPR	35,40	22,00	48,00	7,02	-,07	-,65
MTAPN	27,30	16,00	47,00	8,02	1,29	,97
MTAPNZ	22,63	12,00	33,00	6,60	-,11	-1,17
MPZD	13,63	10,00	24,00	3,08	2,01	4,55
MPRK	27,63	13,00	40,00	6,89	-,35	-,48
MSPZ	187,47	154,00	213,00	10,88	-,39	2,66
MSPM	190,73	163,00	212,00	12,61	-,10	-,41
MISP	66,83	39,00	100,00	16,73	,49	-,37

Table 3. Basic statistical parameters in the specific motor tests

Variables	Mean	Minimum	Maximum	Std.Dev.	Skewness	Kurtosis
SMAEGERI	10,90	6,00	16,00	2,56	,20	-,75
SMAVASI	10,70	5,00	17,00	2,83	,59	,06
SUSIRO	6,03	3,00	11,00	1,85	,76	,32
SKIZAME	8,90	6,00	16,00	2,62	1,45	1,36
SGJAKO	10,23	7,00	16,00	2,60	,58	-,57
SKIZADJAK	7,63	5,00	12,00	1,87	,78	,22
STAPNSR	22,07	17,00	35,00	3,81	1,63	3,64
STAPRSR	27,20	19,00	38,00	4,85	,55	-,33
SUDMPR	8,90	5,00	10,00	1,42	-1,35	1,02
SUDMNR	8,60	5,00	10,00	1,40	-1,06	,97
SUDMPN	9,27	7,00	10,00	,91	-1,17	,73
SUDMNN	8,93	7,00	10,00	1,05	-,63	-,74
SIHCUKI	1,57	1,10	2,63	,37	1,10	,97
SIHOMAEG	3,66	2,25	4,80	,62	,01	-,27
STATESIHO	1,96	1,25	3,11	,45	,39	-,15
STATEMAEG	4,06	2,87	5,55	,72	,36	-,30
SOHMG	13,46	3,00	67,00	14,35	2,30	5,88
SZHMVG	3,75	1,80	7,00	1,34	,61	-,45
SOHMVG	6,67	2,00	41,00	6,93	4,48	22,26
SZHMVG	3,08	1,40	4,70	,75	,02	,39

**For assessing the repetitive force:**

1.Lifting the legs and hands from lying on back (MPNLG) 2.Push-ups (MSKP) 3.Flexions on shaft with up grip (MZNP) .4.Lifting of the body for 30 “(MPT30).

*For assessing the static force:*

1.Hang in flexion with up grip (MVZNH) 2.Hang in flexion with sub grip (MVZPH) 3.Withstand by lying on chest (MIZGRAD) 4.Withstand by lying on back (MIZGRB)

*For assessing the speed movements:*

1.Taping with hand for 15 “(MTAPR) 2.Taping with leg for 15”(MTAPN) 3.Taping with legs on wall for 15 “(MTANS)4.Overlap-twist-touch 20” (MPZD ).

*For assessing the flexibility:*

1.Overlap on bench (MPRK) 2.Split (MSPZ) 3.Straddle (MSPM) 4.Flex with bat (MISP).

**Specific motor tests**

*(For assessing specific karate frequency of movement)*

1.Kick in bag MAE GERRI with favor leg for 10 “(SMAEGERI),  
2. Kick in bag MAVASHI GERRI with favor leg for 10”(SMAVASI),  
3 Kick in bag USHIRO GERRI with favor leg for 10. ”(SUSIRO),  
4. Kick in bag KIZAME CUKI with favor hand

for 10 “(SKIZAME),

5.Kick in bag GJAKO CUKI with favor hand for 10 “(SGJAKO),

6.Kick in bag KIZAME GJAKO CUKI (favor guard) for 10 “(SKIZAGJAK),

7.Taping with leg in sagittal plane for 10 sec. (STAPNSR),

8.Taping with hand in sagittal plane ABOUT 10 sec. (STAPRSR),

*(For assessing specific karate precision)*

9.Hitting a moving target with favor hand (SUDMPR),

10.Hitting a moving target with weaker hand (SUDMNR),

11. Hitting a moving target with favor leg (SUDMPN),

12. Hitting a moving target with weaker leg (SUDMNN).

*(For assessing specific karate coordination)*

13. Kick by hand in body with turning on four sides-Shihon cuki (SIHCUKI),

14. Kick by leg in body with turning on four sides-Shihon Mae geri (SIHOMAEG),

15. Defence by hand and blow into the body by turning on four sides - Tate Shuto uke Shihon cuki (STATESIHO),

16. Defence by hand and kick with leg in the body by turning on four sides- Tate Shuto uke Shihon Mae geri (STATEMAEG),

*(For assessing specific karate balance)*

- 17. Standing on low beam on one leg with open eyes, and the other leg in a distinctive position - hikejaši mae geri (SOHMG),
- 18. Standing on low beam on one leg with closed eyes, and the other leg in a distinctive position - hikejaši mae geri (SZHMG),
- 19. Standing on low beam on one leg with open eyes, and the other leg in a distinctive position - hikejaši mavashi geri (SOHMG),
- 20. Standing on low beam on one leg with closed eyes, and the other leg in a distinctive position - hikejaši mavashi geri (SZHMG),

**RESULTS**

In Tables 1, 2 and 3 are shown the basic descriptive statistical parameters of the applied anthropometric measures, basic and specific motor tests at karateists. They primarily served for correct implementation of further data-specific motor tests at karateists. They primarily served for correct implementation of further data processing, ie for factorization of anthropometric measures, basic and specific tests, and then for their choice with the highest validity and defini-

*Table 4. Factor analysis of anthropometric measures for assessing the longitudinal dimension of the skeleton*

Anthropometric measures	Factor 1	h <sup>2</sup>
AVNT	-.87	.76
ADNR	-.76	.58
ADNN	-.91	.82
ADNS	-.13	.02
ARNS	-.48	.23

tion with maximum and minimum values.

In table 4, are shown results of Hotelling's method main components. Because is isolated one major component, the further factorization for transformation of its data is not extended. This table is just an example of factorization of the applied anthropometric measures and motor tests. Such factorizations are made and for other measures and tests according to hypothetical spaces in which exist their latent dimensions of the basic and specific motor tests. These tables because of limited text space, are not attached in this paper.

From the table 5, it may be noted that from 64

*Table 5. Saturations and communalities (h<sup>2</sup>) of the factor most valued anthropometric measures, basic and specific motor tests*

Variables	Saturations	h <sup>2</sup>
ADNN	-.91	.82
ADNSZ	.94	.89
ATNT	.92	.85
AKNM	.89	.80
M20ISP	.78	.61
MTOM	.88	.77
MPT30	.79	.62
MVZNH	.88	.78
MTAPN	.74	.54
MSPM	.88	.78
SMAEGERI	.81	.66
SUDMPR	.77	.59
SIHOMAEG	.90	.80
SOHMG	-.83	.69

*Table 6. Referent values (maximal and minima results) of the factor most valued anthropometric measures and motor test*

Variables	Maximum	Minimum
ADNN	111,00	87,00
ADNSZ	8,70	6,10
ATNT	93,00	52,00
AKNM	8,20	24,00
M20ISP	13,50	29,00
MTOM	695,00	520,00
MPT30	46,00	15,00
MVZNH	57,10	7,00
MTAPN	47,00	16,00
MSPM	212,00	163,00
SMAEGERI	16,00	6,00
SUDMPR	10,00	5,00
SIHOMAEG	2,25	4,80
SOHMG	41,00	2,00

variables are separated 14 factor most valued variables for assessment of anthropological status which are short test battery. As may be noted these anthropometric measures and motor tests have statistically saturations with isolated factors of the relevant factorizations which are defined with the

example of table 4. From the values review of the communalities, it may be noted they are high and compatibility with correspondent saturations.

From table 6, it may be noted the relevant referent values which are reaper for classifying the potential karateists or already defined karateists with longer sport experience. On that way, the maximum and minimum values of the relevant anthropometric measures and motor tests, may be used for selection of the potential karateists and future programming of the training process of the karateists who are included in the sport competitions. In this point, it would be possible to asses the anthropometric measures and motor test of the potential and permanent karateists are they have sub average, average or above average values, and analog on that would be determined their level of success in the karate sport.

## CONCLUSION

Considering the facts from the research which in some way diminish the possibility of generalization of the obtained results, as the small number of respondents (30), the absence of functional and psychological and sociological indicators, from this research we can draw the following conclusion:

The obtained research can be used for review and assessment of the abilities level of the potential and permanent karateists, which is of great importance for selection and realization of the training process in the karate sport.

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## РЕФЕРЕНТНИ ВРЕДНОСТИ НА НЕКОИ ФАКТОРСКИ НАЈВАЛИДНИ АНТРОПОМЕТРИСКИ И МОТОРНИ ВАРИЈАБЛИ КАЈ КАРАТИСТИТЕ

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### Апстракт

Целта на истражувањето беше да се утврдат референтните вредности на некои манифестни антропометриски мерки и моторни тестови врз основа на нивниот највисок степен на валидност кој е добиен од нивната факторизација кај членовите на македонската карате репрезентација. Истражувањето е реализирано на 30 испитаници (каратисти) на возраст од 16 до 27 години. На испитаниците се примениле 64 антропометриски мерки и моторни тестови. Од нив беа: 17 антропометриски мерки, 27 базични моторни тестови и 20 специфични моторни тестови. По факторизација на сите антропометриски мерки и моторни тестови, од нив се избрани 14 антропометриски мерки и моторни тестови со највисок степен на валидност. На тие мерки и тестови одредени се минималните и максималните манифестни резултати. На тој начин, е овозможено да се класификува секој поиндивидуален каратист или каратист кој подолго време е вклучен во тренирањето и карате-најпреварите.

**Клучни зборови:** тестирање, базични моторни тестови, специфични моторни тестови, факторска анализа