

1. PHYSICAL FITNESS OF THE TOP JUDOISTS IN JAPAN (1967)

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After Tokyo Olympic Games 1964 the physical measurement is seldom taken in judo as in other sports. Therefore, at this time, referring to the former measurement subjects, we took the physical measurement by new method, adding the peculiarity of judo, and established the physical measurement method of judoists. And the measurement of Judoists is taken in order to know the present status of their physical fitness, by making use of the training camp of candidate players, and we are going to report its results in the following

METHOD OF INVESTIGATION

Measurement Date And Object

The measurement was taken at Kodokan on March 12th, 1967. The measurement objects are as follows.

subter-light weight class	Yasuo Sasaki, Yoshimitsu Hayama, Tsuguteru Niki Kazuo Saito, Masayoshi Iwata,
light weight class	Yoshio Sonoda, Yujiro Yamazaki, Junichi Inoue, Yoshimitsu Kono, Takabumi Shigeoka, Yuei Nakatani
middle weight class	Hiromi Tomita, Mitsuhiro Kawatsuka, Eiji Maruki Masayuki Yamashita, Katsuji Seki
heavy weight class	Tomoyuki Kawabata, Shoichi Yamamoto, Mitsuhide Kazuki, Nobuyuki Sato, Takeshi Matsuzaka, Osamu Sato
super-heavy weight class	Masayoshi Murai, Yuyo Yamamoto 24 in all

The age extends from 20.8 to 27.10 and the average 23.10.

Measurement Subjects

After being discussed from various points of view by the committee, the following subjects were measured.

Morphological Features

body weight, height, girth of chest, girth of hips, girth of upper arm extension (right and left) girth of forearm (right and left) girth of neck, girth of thigh (right and left), girth of leg (right and left) girth of wrist (right and left) length of upper limb (right and left) length of lower limb (right and left) subcutaneous fat and photograph (front, side and back)

Function

grip strength (right and left) back strength, finger strength (right and left) leg strength, arm flexion strength (right and left) pull strength, gluteal muscle strength (right and left) standing trunk flexion, flexibility of ankle joint (adduction and abduction, extension and flexion in right and left) twist of upper body, vital capacity, maximal breathing capacity, abdominal muscular endurance,

upper arm endurance, reaction time, Harvard step test.

We are going to say the measurement method of subjects except those written in Judoists' Guide to Physical Fitness Test later mentioned.

As for finger strength, revising the grip of a hand-dynamometer, we measured one finger flexion strength including index, middle, ring, and little fingers each just like pulling the trigger. In the case of leg strength, making use of back strength meter, we took measurement by bending knee joints to 120 degrees and lifting them upward. In arm flexion strength, an examinee sat on a chair and took a supinate position bending his elbows perpendicular and strength was added. In the case of gluteal

Table 1 Individual List of Measurement of Judoist's Physical Fitness

	class	birth date	age	body weight (kg)	height (cm)	girth of chest (cm)
Yasuo Sasaki	subter-light	28. 11. '42	24. 4	61	163.8	96.7
Yoshimitsu Hayama		6. 7. '46	20. 8	63	164.1	94.8
Tsuguteru Niki		8. 7. '39	27. 8	64	163.8	92.5
Kazuo Saito		4. 3. '45	22. 0	65	163.4	93.7
Masayoshi Iwata		24. 12. '43	23. 3	69	165.9	92.5
average				64.4	663.9	94.0
Yoshio Sonoda	light	30. 8. '45	21. 7	70	168.3	94.8
Yujiro Yamazaki		1. 5. '45	21.10	69	163.3	97.4
Junichi Inoue		29. 11. '45	21. 4	72	178.3	93.5
Yoshimitsu Kono		17. 10. '46	21. 5	72	165.2	97.8
Takabumi Shigeoka		2. 1. '44	23. 2	67	162.4	94.1
Yuei Nakatani		9. 7. '41	25. 8	72	164.1	99.7
average				70.3	166.9	96.2
Hiromi Tomita	middle	25. 1. '44	23. 2	72	168.1	99.7
Mitsuhiro Kawatsuka		13. 9. '44	22. 6	81	178.9	101.1
Eiji Maruki		25. 5. '43	23.10	79	170.5	100.1
Masayuki Yamashita		23. 3. '45	22. 2	75	170.8	98.8
Katsuji Seki		18. 5. '39	27.10	80	170.3	106.2
average				77.4	171.7	101.2
Tomoyuki Kawabata	heavy	9. 2. '44	23. 1	91	177.1	102.5
Shoichi Yamamoto		1. 3. '40	27. 0	94	172.7	109.4
Mitsuhide Kazuki		9. 7. '44	22. 6	90	182.8	140.6
Nobuyuki Sato		12. 1. '44	23. 2	86	177.0	99.8
Takeshi Matsuzaka		20. 12. '39	27. 3	94	171.3	110.3
Osamu Sato		19. 9. '39	27. 6	84	171.4	105.1
average				89.8	175.4	105.3
Masayoshi Murai	super-heavy	13. 4. '42	24.11	105	177.0	116.2
Yuyo Yamamoto		31. 1. '44	23. 4	95	177.2	104.8
average				100.0	177.1	110.5
total average			23.10	77.9	170.3	100.3

muscle strength, an examinee stood by one foot with a belt in a center of his thigh, and kicked aslant backward, of which strength was measured. maximal breathing capacity was tested by expired air exhaled into a Douglas Bag with every efforts within 12 seconds, and abdominal muscular endurance by maximum frequency of sit up in two minutes, and upper arm endurance by maximum frequency of push up in two minutes.

Results and Discussion

An individual list by class of measurement results is as Table 1. And the authors added comment to each player.

girth of hip (cm)	girth of upper arm extension (cm)		girth of forearm (cm)		girth of neck (cm)	girth of thigh (cm)	
	left	right	left	right		left	right
84.8	29.1	28.6	26.6	26.6	35.5	52.8	52.3
92.1	30.2	30.1	27.0	26.3	39.6	50.9	52.0
87.4	31.1	30.2	27.4	26.9	38.2	52.2	53.4
90.5	30.1	31.1	28.0	27.9	38.9	53.5	57.2
94.6	30.9	29.4	27.6	27.3	38.0	52.0	54.4
89.9	30.3	29.9	27.3	27.0	38.0	52.3	53.9
94.6	29.2	28.1	26.6	26.3	39.0	54.4	55.6
92.2	30.2	32.1	27.3	28.4	38.3	53.1	53.5
93.5	30.4	29.5	27.6	27.3	38.0	52.6	53.0
96.9	31.3	30.4	28.1	29.3	40.4	55.1	56.1
92.1	30.9	32.1	26.4	27.5	39.0	53.3	52.8
87.1	34.4	31.9	27.8	27.3	40.0	54.0	56.0
92.7	31.1	30.7	27.3	27.7	39.1	53.8	54.5
93.0	32.4	34.2	29.2	29.8	39.5	57.3	56.0
94.9	33.2	35.4	28.9	30.2	40.6	56.8	56.6
96.6	35.7	33.9	31.5	—	41.0	55.7	56.5
95.7	32.2	30.8	28.3	27.0	39.5	58.0	59.7
94.0	32.5	32.1	30.7	30.6	40.6	56.0	57.0
94.8	33.2	33.3	29.7	29.4	40.2	56.8	57.2
107.1	36.7	35.6	30.2	30.3	45.7	61.5	64.2
102.8	37.9	40.6	32.2	32.6	44.5	65.6	63.5
98.5	34.8	35.7	—	32.1	42.0	60.6	61.2
99.3	33.8	33.1	30.8	30.5	41.6	61.2	61.4
103.6	36.6	36.2	31.4	31.1	41.9	65.1	64.5
99.0	35.7	34.4	30.9	30.6	40.5	57.8	60.0
101.7	35.9	35.9	31.1	31.2	42.7	62.0	62.5
104.8	34.8	34.3	30.7	31.1	42.2	66.5	65.5
102.4	34.4	34.5	29.5	29.9	42.6	62.1	61.9
103.6	34.6	34.4	30.1	30.5	42.4	64.3	63.7
95.7	32.9	32.7	28.9	29.0	40.7	57.0	57.7

In the second list both the measurement average and the former average by the same method are shown.

The survey of measurement results is as follows.

Morphological Features

The total average of measurement value this time is 170.3 centimeters in height, 77.9 kilograms in body weight, and 100.3 centimeters in girth of chest. Comparing this average value with the former one, we find this rather small, which we think was caused by the new establishment of subter-light weight class. According to this numerical value, it seems that many Judoists are comparatively

Table 1 (continued)

	girth of leg (cm)		girth of wrist (cm)		length of upper limb (cm)		length of lower limb (cm)	
	left	right	left	right	left	right	right	right
Yasuo Sasaki	36.2	36.7	16.6	16.5	73.2	73.1	92.6	91.9
Yoshimitsu Hayama	37.2	37.5	16.7	61.9	71.6	71.5	91.8	92.4
Tsuguteru Niki	35.7	35.5	16.4	61.9	71.6	71.4	94.1	93.7
Kazuo Saito	36.3	35.7	18.5	17.5	70.1	70.6	92.3	93.0
Masayoshi Iwata	37.3	35.7	17.7	17.6	74.7	74.7	89.8	89.4
average	36.5	36.6	17.2	17.1	72.2	72.3	92.1	92.1
Yoshio Sonoda	36.5	38.8	17.5	17.1	74.8	77.8	96.5	97.5
Yujiro Yamazaki	38.1	39.0	17.9	17.5	72.5	71.7	94.4	9.44
Junichi Inoue	36.4	36.5	17.9	17.3	78.7	78.6	100.8	100.9
Yoshimitsu Kono	38.6	38.4	18.0	18.2	73.5	73.5	95.1	95.0
Takabumi Shigeoka	33.7	37.5	17.1	17.6	70.5	69.9	88.7	87.8
Yuei Nakatani	38.8	39.1	17.4	17.5	70.2	71.0	89.1	90.4
average	37.0	38.2	17.6	17.5	73.4	73.8	94.1	94.3
Hiroimi Tomita	38.5	39.0	17.8	18.2	73.8	73.7	98.1	98.0
Mitsuhiro Kawatsuka	41.0	39.8	18.2	18.3	79.3	78.6	99.4	100.6
Eeiji Maruki	41.0	40.7	18.6	18.3	75.7	76.2	97.2	97.1
Masayuki Yamashita	38.6	40.1	17.8	17.8	76.3	76.0	97.7	98.0
Katsuji Seki	40.7	40.8	19.1	18.9	74.6	75.3	100.4	100.4
average	40.0	40.1	18.3	18.3	75.9	76.0	98.6	98.8
Tomoyuki Kawabata	40.7	41.5	18.8	18.9	76.2	75.8	98.8	98.8
Shoichi Yamamoto	41.4	42.1	19.3	19.2	71.7	68.8	94.5	95.0
Mitsuhide Kazuki	43.0	43.1	19.0	18.8	81.5	81.2	104.7	104.4
Nobuyuki Sato	41.5	41.2	20.0	20.3	76.8	77.1	100.3	99.6
Takeshi Matsuzaka	43.2	45.0	19.5	19.5	71.3	71.3	98.3	97.4
Osamu Sato	38.4	38.4	19.1	19.1	75.6	76.9	99.6	99.1
average	41.4	41.9	19.3	19.3	75.5	75.2	99.4	99.1
Masayoshi Murai	43.7	44.0	20.0	20.0	80.3	80.3	101.3	101.2
Yuyo Yamamoto	43.4	44.0	18.5	19.0	76.8	77.0	100.4	100.1
average	43.6	44.0	19.3	19.5	78.6	78.7	100.9	100.7
total average	39.2	39.7	18.2	18.2	74.6	74.7	96.5	96.5

stout. This is supported by the fact that girth of neck is 40.7 centimeters and big and moreover, girth of chest is about 5 centimeters wider than girth of hips, which shows the remarkable growth of upper body. Compared with that in 1963, girth of upper arm is superior, but height, body weight, girth of chest, girth of forearm, girth of wrist, girth of thigh, girth of calf and skinfold are inferior. Further in the case of Nobuyuki Sato, a second winner of All Japan Championship, skinfold is only 5.1 millimeters, which is different from the former image of judoists, and his body is muscular and well-balanced. The emergence of this type of player is of great interest for the future way of judo.

fat (mm)	grip strength (kg)		back strength (kg)	finger strength (kg)					
	left	right		(II) left	(II) right	(III) left	(III) right	(IV) left	(IV)right
6.0	46.0	39.0	142	17	17	22	22	17	15
6.5	44.0	42.0	148	16	17	22	24	17	19
4.5	44.0	48.0	155	15	18	22	26	16	15
4.7	48.5	52.5	149	19	24	22	25	18	20
7.0	49.5	53.5	148	26	23	25	26	17	21
5.7	46.4	47.0	148.4	18.9	19.8	22.6	24.6	17.0	18.0
7.2	44.5	42.0	155	20	19	22	23	14	20
5.6	47.0	42.5	136	16	19	21	25	14	21
6.0	46.0	47.5	159	15	25	22	25	19	20
13.0	43.5	44.0	126	17	16	18	20	14	15
8.0	42.5	42.0	116	15	15	24	23	17	18
5.5	40.5	40.5	126	14	15	18	20	13	15
7.6	44.0	43.1	136.3	16.2	18.2	20.8	22.7	15.2	18.2
4.9	58.5	59.0	192	17	22	20	28	17	18
5.7	49.5	56.5	181	16	24	19	26	13	16
8.7	52.0	55.5	177	19	20	27	27	14	23
7.5	50.5	57.5	177	16	19	26	24	17	19
5.2	49.5	55.5	159	16	21	20	23	18	19
6.4	52.0	56.8	177.2	16.8	21.2	22.4	25.6	15.8	19.0
18.5	43.0	48.0	176	21	19	25	23	16	19
17.0	52.0	42.5	162	22	19	25	25	18	15
5.1	67.0	71.0	210	23	26	27	32	20	26
5.1	52.5	52.0	162	23	24	30	23	20	19
19.0	46.5	53.5	175	23	24	24	27	21	21
10.4	57.0	65.0	180	22	19	24	23	15	19
12.5	53.0	55.3	177.5	22.3	21.8	25.8	25.5	18.3	19.8
22.0	49.0	52.5	178	19	21	17	24	13	17
25.0	44.5	49.5	182	18	17	24	24	17	20
23.5	46.8	51.0	180.0	18.5	19.0	20.5	24.0	15.0	18.5
9.5	48.6	50.5	161.3	18.5	20.1	22.8	24.5	16.5	18.8

Function

The total average of back strength is 161.3 kilograms and grip strength, 50.5 kilograms (right) 48.6 kilograms (left), which is the remarkable degeneration, compared with that in 1963. As mentioned before, the decrease of skinfold is the characteristic of players this time, but it's no good muscle strength also decreased. Arm strength is comparatively strong, which We think has much to do with the bigness of girth of upper arm.

Pull strength, gluteal muscle strength and leg strength increase almost in proportion to the constitution, so it may be considered muscle strength increases as body weight increases. But no great

Table 1 (continued)

			leg strength (kg)	arm flexion strength (kg)		pull strength (kg)
	(V) left	(V) right		left	right	
Yasuo Sasaki	10	7	162	43.0	36.0	80
Yoshimitsu Hayama	10	13	142	30.5	35.5	75
Tsuguteru Niki	12	12	170	40.0	36.0	77
Kazuo Saito	12	11	170	36.5	39.5	75
Masayoshi Iwata	13	15	—	32.5	32.0	76
average	11.4	11.6	161.0	36.5	35.6	76.6
Yoshio Sonoda	8	8	148	34.5	35.0	76
Yujiro Yamazaki	11	11	182	31.0	37.0	82
Junichi Inoue	9	13	152	35.0	35.0	73
Yoshimitsu Kono	9	9	150	34.0	35.5	75
Takabumi Shigeoka	10	8	148	31.5	39.0	70
Yuei Nakatani	7	8	128	33.0	40.0	69
average	9.0	9.5	151.3	33.2	36.9	74.2
Hiromi Tomita	11	14	208	41.0	49.5	94
Mitsuhiro Kawatsuka	9	11	202	36.0	34.5	92
Eiji Maruki	11	10	148	43.0	44.5	80
Masayuki Yamashita	11	9	178	32.0	33.0	84
Katsuji Seki	13	14	205	36.0	45.0	81
average	11.0	11.6	188.2	37.6	41.3	86.2
Tomoyuki Kawabata	14	16	238	36.0	41.0	84
Shoichi Yamamoto	12	10	206	44.0	42.0	86
Mitsuhide Kazuki	15	16	238	39.5	50.0	102
Nobuyuki Sato	10	12	236	41.0	38.0	88
Tsuyoshi Matsuzaka	14	15	166	38.0	34.0	91
Osamu Sato	11	12	170	34.0	38.5	92
average	12.7	13.5	209.0	38.8	40.6	90.5
Masayoshi Murai	10	11	232	35.0	38.0	97
Yuyo Yamamoto	10	14	246	41.5	39.5	94
average	10.0	12.5	236.0	38.3	38.8	95.5
total average	10.9	11.6	183.4	36.6	38.6	83.0

difference in muscle endurance strength was found among classes.

It is an interesting fact that standing trunk flexion is comparatively good in light weight class, while twist of upper body is good in heavy weight class. No remarkable difference among classes can be seen in flexibility of ankle joints.

Vital capacity increases with body weight, but Harvard step test is rather bad in heavy weight classes. This is because the former is much related with the physical forms and on the other hand body weight is a burden to the latter. Generally, respiratory-circulatory function has not been so good, compared with another sports and the inclination is not much improved yet. No distinction among classes was

gluteal muscle strength (kg)		standing trunk flexion (cm)	flexibility of ankle joint adduction and abduction, extension and flexion (degree)				twist of upper body (degree)	
left	right		left	right	left	right	left	right
91	73	14.7	56	72	56	57	92.5	90.0
82	73	16.7	97	93	82	72	115.0	110.0
80	78	26.4	86	96	76	74	115.0	120.0
80	80	16.2	83	82	64	67	110.0	110.0
57	60	17.0	71	74	60	59	85.0	100.0
78.0	72.8	18.2	87.6	83.4	67.6	65.8	103.5	106.0
62	73	19.5	75	76	66	67	92.6	95.0
62	71	19.6	74	78	63	68	115.0	105.0
82	80	17.8	81	83	61	54	120.0	125.0
67	60	24.5	89	88	65	73	115.0	130.0
85	86	23.6	104	106	83	83	97.5	95.0
100	105	17.7	84	77	65	73	100.0	115.0
74.7	79.2	20.5	84.5	84.5	67.2	69.7	106.7	110.8
87	91	24.1	60	46	60	68	100.0	115.0
71	71	17.3	69	69	65	61	95.0	90.0
62	62	8.7	52	33	48	41	85.0	100.0
69	86	17.4	74	62	67	71	100.0	125.0
109	107	18.0	102	91	79	79	95.0	125.0
79.6	83.4	17.1	71.4	60.2	63.8	64.0	95.0	111.0
69	85	19.5	78	89	64	60	105.0	110.0
116	102	18.4	67	69	41	42	95.0	100.0
94	100	19.5	77	60	63	58	110.0	115.0
84	87	20.0	85	89	63	64	115.0	105.0
177	120	17.5	55	62	53	58	100.0	105.0
78	89	7.5	69	81	61	65	105.0	120.0
93.0	97.2	17.5	71.8	75.0	57.5	57.8	105.0	109.2
93	80	3.0	76	69	62	67	120.0	120.0
118	103	6.8	65	66	54	62	120.0	120.0
105.5	91.5	4.9	70.5	67.5	58.0	64.5	120.0	120.0
83.5	84.3	17.1	76.2	75.5	63.4	64.3	110.2	110.0

found in simple reaction time by light stimulus, and it may be said its grade is normal.

Record of follow-up of Shigeoka, Nakatani, Tomita, Seki, Matsuzaka and Sato measured before the physical fitness change of the same person is shown in the Table 3. As can be known from the Table 3, in all of them body weight tends to increase, and above all, Matsuzaka put on 12 kilograms weight. Subjects which physical fitness are remarkably decreasing lately are back and grip strength. Its level lowered to that in 1962 or 1961, with that in 1963 its peak. On the other hand grip strength does not show the regular tendency and in the case of Shigeoka, Nakatani and Tomita, the strength has rather increased recently and in the case of Seki, Matsuzaka and Sato decreased. Flexibility is

Table 1 (continued)

	vital capacity (cc)	maximum quantity of ventilation (l/min)	abdominal muscular endurance (frequency)	upper arm muscular endurance (frequency)	reaction time (msec)	Harvard step test (point)
Yasuo Sasaki	3,760	106.3	85	—	251	48.7
Yoshimitsu Hayama	3,800	122.2	105	82	228	100.0
Tsuguteru Niki	4,300	155.2	86	81	168	114.5
Kazuo Saito	4,060	191.6	97	96	146	109.5
Masayoshi Iwata	4,420	119.1	66	52	182	80.6
average	4,068	138.9	87.8	77.8	195	90.7
Yoshio Sonoda	3,700	104.4	87	65	219	87.7
Yuziro Yamazaki	4,100	138.3	95	75	165	100.7
Junichi Inoue	4,180	180.2	87	49	149	86.7
Yoshimitsu Kono	4,650	180.2	81	67	190	88.2
Takabumi Shigeoka	3,880	99.1	84	96	172	121.0
Yuei Nakatani	3,980	124.3	96	80	171	113.6
average	4,082	125.8	88.3	72.0	178	99.7
Hiromi Tomita	4,700	128.6	96	75	169	99.3
Mitsuhiro Kawatsuka	5,140	178.7	70	54	229	82.9
Eiji Maruki	5,180	83.0	81	73	189	96.2
Masayuki Yamashita	4,860	135.5	101	57	170	91.5
Katsuji Seki	3,440	136.9	95	69	188	100.0
average	4,664	132.5	88.6	65.6	189	94.0
Tomoyuki Kawabata	4,920	1.587	85	83	238	32.3
Shoichi Yamamoto	4,360	97.3	85	75	216	82.4
Mitsuhide Kazuki	5,700	152.3	84	65	182	85.2
Nobuyuki Sato	4,540	198.8	109	80	195	98.0
Tsuyoshi Matsuzaka	5,120	124.1	84	—	183	86.7
Osamu Sato	3,880	118.5	84	76	256	67.0
average	4,753	141.6	88.5	75.8	212	75.3
Masayoshi Murai	5,540	106.5	—	68	186	50.8
Yuyo Yamamoto	5,420	116.5	83	56	203	83.3
average	5,480	111.5	83.0	62.0	195	67.1
total average	4,485	132.7	88.1	71.5	194	87.8

comparatively well maintained, and twist of upper body is maintained as before in the case of Nakatani and Sato but in others lowered. Harvard step test does not decrease much without being related with the increase of body weight. Shigeoka and Nakatani have rather got the best mark in this test while in the case of Sato the decline is great.

According to the measurement results above, grip strength and back strength have recently fallen rapidly while on the whole skinfold has decreased and the tendency of slenderness can be seen. This fact was not noticed as the physical fitness measurement has not been taken for the past four years. And having a look at the process of the same person body weight is gradually increasing and muscular strength declining, which shows the lack of training. Therefore, at this time, it is necessary to investigate the training method of judoists, and to establish the right way of training. It is necessary, above all, to make the muscular training complete.

Conclusion

We measured the physical fitness after 4 years since 1963 and its results are as follows.

- (1) The skinfold of judoists declined and on the whole many became muscular.
- (2) But, compared with that in 1963, grip strength and back strength declined rapidly and muscular training is not given enough.
- (3) Comparison with the former value could be made in the case of 5 players, whose muscular strength declined in spite of the increase of body weight.
- (4) It is necessary from now on to measure the physical fitness regularly. And so, it is desirable to set the measuring method for it.
- (5) As the physical fitness training of judo players is not given enough, it is necessary to pay more attention to it and make the right method of training.

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general comment	
Yasuo Sasaki	Arm strength is strong, but weak on the whole. In left and right strength is unbalanced.
Yoshimitsu Hayama	He excels in flexibility and endurance, but is poor at muscle strength.
Tsuguteru Niki	He excels in flexibility, agility and endurance. More muscle strength is hoped for him.
Kazuo Saito	He excels in agility and endurance, but is a little weak in muscle strength.
Masayoshi Iwata	His strength of little finger is strong, but on the whole one more step-up is hoped for him.
Yoshio Sonoda	His back strength is rather good, but insufficient on the whole.
Yujiro Yamazaki	He is balanced on the whole, but one more step-up is hoped.
Junichi Inoue	He is tall and excels in agility, but weak in muscle strength.
Yoshimitsu Kono	Flexibility is good, but he is weak in muscle strength, and his skinfold is thick.
Takabumi Shigeoka	He excels in flexibility, agility and endurance, but weak in muscle strength.
Yuei Nakatani	He excels in endurance and agility, but a little more fullness of muscle strength is hoped.
Hiromi Tomita	He excels in muscle strength and agility.
Mitsuhiro Kawatsuka	He is tall and excels in muscle strength, but is poor at flexibility and endurance.
Eiji Maruki	He is fat and stout, but lacks in flexibility.
Masayuki Yamashita	He excels in abdominal muscle strength.
Katsuji Seki	Girth of chest is wide, but vital capacity little.
Tomoyuki Kawabata	A little more fullness of flexibility and endurance is hoped.
Shoichi Yamamoto	Girth of chest is wide and stout, but he is poor at flexibility and endurance.
Mitsuhide Kazuki	He excels much in muscle strength, but a little more fullness of flexibility and endurance is hoped.
Nobuyuki Sato	He is balanced on the whole, but a little more maturity is necessary.
Tsuyoshi Matsuzaka	He is stout, but insufficient in muscle strength, endurance and flexibility.
Osamu Sato	Muscle strength is good, but he is poor at flexibility, endurance and agility.
Masayoshi Murai	He is balanced on the whole, but lacks in flexibility.
Yuyo Yamamoto	His leg strength is good, but a little more fullness is hoped on the whole.

Table 2 Average Value and Comparison by Year

year		March, 1967						August, 1963				August 1962	August 1961
		sub- light 5 per- sons	light 6 per- sons	middle 5 per- sons	heavy 6 per- sons	super- heavy 2 per- sons	total aver- age 24 per- sons	light 6 per- sons	middle 6 per- sons	heavy 10 per- sons	total aver- age 22 per- sons	total aver- age 46 per- sons	total aver- age 101 Persons
body weight	kg	64.4	70.3	77.4	89.8	100.0	77.9	67.9	81.1	98.2	85.5	82.9	79.5
height	cm	163.9	166.9	171.7	175.4	177.1	170.3	165.9	170.3	178.3	172.7	173.8	171.8
length of upper limb	right cm	72.3	73.8	76.0	75.2	78.7	74.7						
	left cm	72.2	73.4	75.9	75.5	78.6	74.6						
length of lower limb	right cm	92.1	94.3	98.8	99.1	100.7	96.5						
	left cm	92.1	94.1	98.6	99.4	100.9	96.5						
girth of neck	cm	38.0	93.1	40.2	42.7	42.4	40.7						
girth of chest	cm	94.0	96.2	101.2	105.3	110.5	100.3	92.0	101.8	107.0	101.7	100.6	100.6
girth of regio glutea	cm	89.9	92.7	94.8	101.7	103.6	95.7	91.5	96.1	105.1	98.9	98.7	98.7
girth of upper arm (extention)	right cm	29.9	30.7	33.3	35.9	34.4	32.7	27.0	31.4	33.5	31.7	31.7	30.9
	left cm	30.3	31.1	33.2	35.9	34.6	32.9	27.5	32.0	34.2	32.3	31.7	30.8
girth of forearm	right cm	27.0	27.7	29.4	31.2	30.5	29.0	27.3	29.9	31.0	29.7	29.8	27.9
	left cm	27.3	27.3	29.7	31.1	30.1	28.9	27.4	29.6	30.7	29.5	29.5	27.6
girth of wrist	right cm	17.1	17.5	18.3	19.3	19.5	18.2	17.7	19.0	19.8	19.0	18.7	18.1
	left cm	17.2	17.6	18.3	19.3	19.3	18.2	17.8	19.0	19.7	19.0	18.6	17.9
girth of thigh	right cm	53.9	54.5	57.2	62.5	63.7	57.7	53.3	57.4	63.6	59.1	58.4	
	left cm	52.3	53.8	56.8	62.0	64.3	57.0	53.1	57.1	63.4	59.0	58.3	
girth of leg	right cm	36.6	38.2	40.1	41.9	44.0	39.7	37.2	39.1	42.3	40.0	40.0	38.8
	left cm	36.5	37.0	40.0	41.4	43.6	39.2	36.5	38.5	41.4	39.3	39.8	38.7
subcutaneous fat	mm	5.7	7.6	6.4	12.5	23.5	9.5	7.8	10.9	18.2	13.4	12.6	20.0
back strength	kg	148.4	136.3	177.2	177.5	180.0	161.3	178.8	190.5	200.7	192.0	165.6	142.2
grip strength	right kg	47.0	43.1	56.8	55.3	51.0	50.5	54.3	64.3	62.4	60.7	59.8	54.4
	left kg	46.4	44.0	52.0	53.0	46.8	48.6	51.5	59.3	59.7	57.3	57.2	50.1
finger strength	II	right kg	19.8	18.2	21.2	21.8	19.0	20.1					
		left kg	18.6	16.2	16.7	22.3	18.5	18.5					
	III	right kg	24.6	22.7	25.6	25.5	24.0	24.5					
		left kg	22.6	20.8	22.4	25.8	20.5	22.8					
	IV	right kg	18.0	18.2	19.0	19.8	18.5	18.8					
		left kg	17.0	15.2	15.8	18.3	15.0	16.5					
	V	right kg	11.6	9.5	11.6	13.5	12.5	11.6					
		left kg	11.4	9.0	11.0	12.7	10.0	10.9					

Table 2 (continued)

year		March, 1967						August, 1963				August 1962	August 1961
		subter-light 5 per-sons	light 6 per-sons	middle 5 per-sons	heavy 6 per-sons	super-heavy 2 per-sons	total average 24 per-sons	light 6 per-sons	middle 6 per-sons	heavy 10 per-sons	total average 22 per-sons	total average 46 per-sons	total average 101 per-sons
arm strength	right kg	35.6	36.9	41.3	40.6	38.8	38.6	32.5	41.0	42.0	37.0	33.9	30.2
	left kg	36.5	33.2	37.6	38.8	38.3	36.6	32.8	40.0	43.0	39.2	35.6	30.2
pull strength kg		76.6	74.2	86.2	90.5	95.5	83.0						
gluteal muscle strength	right kg	72.8	79.2	83.4	79.2	91.5	84.3						
	left kg	78.0	74.7	79.6	93.0	105.5	83.5						
leg strength kg		161.0	151.3	188.2	209.0	236.0	183.4						
upper arm endurance kg		77.8	72.0	65.6	75.8	62.0	71.5						
abdominal muscle endurance kg		87.8	88.3	88.6	88.5	83.0	88.1						
standing trunk flexion cm		18.2	20.4	17.1	17.1	4.9	17.1	21.5	20.4	17.2	19.3	15.0	14.2
twist of upper body	right degree	106.0	110.8	111.0	109.2	120.0	110.2	113.3	125.0	115.5	117.5	118.5	
	left degree	103.5	106.7	95.0	105.0	120.0	104.3	111.7	119.2	117.0	116.1	114.3	
flexibility of ankle joint	add. & abd.	right degree	83.4	84.7	60.2	75.0	67.5	75.5					
		left degree	78.6	84.5	71.4	71.8	70.5	76.2					
	ext. & flex.	right degree	68.5	69.7	64.0	57.8	64.5	64.3					
		left degree	67.6	67.2	63.8	57.5	58.0	63.4					
vital capacity cc		4068	4082	4664	4753	5480	4485	4055	4742	5336	4825	4996.3	4900.5
maximal breathing capacity 1/min		138.9	125.8	132.5	141.6	111.5	132.7						
Harvard step test point		90.7	99.7	94.0	75.3	67.1	87.8	90.0	87.5	85.0	87.9	94.5	
reaction time msec		195	178	189	212	195	194						

Table 3 Exchanges of Physical Fitness in the Same Judoist

		Shigeoka				Nakatani			Tomita			Seki			Matsuzaka		Sato (Osamu)	
		1967	1963	1962	1961	1967	1963	1962	1967	1963	1962	1967	1963	1962	1967	1963	1967	1963
body weight	kg	67	65.0	63.5	62.9	72	69.5	68.0	72	700	67.4	80	81.5	78.0	94	82.0	84	82.0
height	cm	162.4	163.0	162.4	161.1	164.1	164.8	164.5	168.1	170.0	168.9	170.3	170.7	170.9	171.3	171.5	171.4	171.8
girth of chest	cm	64.1	90.5	89.0	92.7	99.7	95.5		99.7	94.0		106.2	104.3		105.1	103.0	105.1	103.0
fat	mm	8.0	6.9	5.0	4.0	5.5	7.0	7.5	4.9	5.3	6.0	5.2	6.5	7.0	19.0	8.0	10.4	9.5
back strength	kg	116	162	164	118	126	156	136	192	215	186	159	186	165	175	207	108	219
grip strength	right kg	42.0	52.5	44.0	49.0	4.05	52.5	49	59.0	61.0	65	55.5	62	60	53.5	60.0	65.0	73.0
	left kg	42.5	48.0	50.0	48.0	40.5	46.0	40	58.5	60.0	62	49.5	57.5	60	46.5	59.5	57.0	62.0
arm strength	right kg	39.0	32.0	31.5	29.0	40.0	34.0	27.0	49.5	34.0	31.5	45.0	49.5	37.0	34.0	41.0	38.5	40.0
	left kg	31.0	38.5	33.0	28.0	33.0	36.0	28.0	41.0	32.5	31.0	36.0	48.0	36.5	38.0	40.5	34.0	35.0
trunk flexion	cm	23.0	25.0	26.3	23.0	17.7	17.0	10.8	24.1	25.5	25.8	18.0	21.0	17.4	17.5	23.0	7.5	19.0
twist of upper body	right degree	95.0	100	125		115.0	110	115	115.0	130	125	125.0	140	142	105.0	130	120.0	105
	left degree	97.5	105	120		100.0	105	100	100.0	120	115	95.0	120	132	100.0	130	105.0	115
vital capacity	cc	3,800	3,860	3,840	3,640	3,980	3,200	3,800	4,700	4,920	4,760	3,440	4,200	4,320	5,120	5,408	3,880	4,270
Harvard step test	point	121.0	101.4	100		113.6	105.6	105.6	99.3	97.4	106.4	100.0	8.93	103.4	86.7	87.2	67.0	92.0