



The Physical Condition of The Sukoharjo Pencak Silat Athlete in Team Category

Original Article

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Abstract

Pencak silat is a sport related to physical needs and physical readiness to support the pencak silat movement. This study aims to determine the energy system in each stance, physical needs and to find out statistical data and the average physical need. This research is a descriptive quantitative with purposive sampling technique. Data were taken using the test items of Push Ups, Sit Ups, 300 M Run, Split Test, 20 M Sprint, Triple Jump, Shuttle Run, Ball Throw, Multi Fitnes-Stages. The research subjects were 6 people which were divided into 3 sons and 3 daughters. Data analysis used descriptive statistics. The results in the male sample showed perfect categories on the triple jump leg muscle power test and medicine ball throw arm muscle power test, very good on the push up arm muscle strength test, sit up abdominal muscle strength, anaerobic 300 m running test, side splits flexibility test, good category on the shuttle run agility test, above average category on Multi Fitnes-Stages, everage category on the 20 m sprint speed test. In the female sample, the results of the push-up arm strength test were in the very good category, the results of the sit-up abdominal muscle strength test were in the very good category, the results of the 300 m run test were in good and medium categories, the side splits test results were in good and medium categories, and the speed test results. 20 m sprint with less category, triple jump leg muscle power test results in good and sufficient category, shuttle run agility test results in sufficient category, medicine ball throw arm muscle power test results with perfect category, below average category endurance test results.

Keywords: *physical needs, energy system, pencak silat, team category*

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INTRODUCTION

Pencak silat is a traditional martial art from Indonesia. According to [1] the definition of pencak silat refers to the word pencak silat, namely pencak has the meaning of performing arts and silat has the meaning of fighting or martial arts. Silat itself has the meaning of fighting skills with dexterity to protect themselves from enemies or opponents. The parent institution of pencak silat is the Indonesian Pencak Silat Association (IPSI). The basic principle of the pencak silat movement according to is self-defense that contains elements of offensive and defensive values.

Pencak silat has two competition categories, the sparring category and the arts category including single art, double art and team art. The sparring class involves two fighters facing each other, using belts of different colors, namely blue and red, equipped with body protector and genital protection. In addition to the sparring category, pencak silat has sufficient artistic elements to carry the inherent cultural uniqueness, especially in terms of development elements and elements of graceful motion in battle. It can be seen that the martial arts are presented by a single fighter by displaying a single IPSI standard stance. When performing a single pose, it involves a tool or weapon that aids the demonstration of the martial art, such as the machete and

toya. As for the doubles, there are 2 fighters with the same gender involving weapons used to show the fast attack movements of a fighter who fights through a pre-designed simulation. Furthermore, the category of teams that are slightly different from single and double arts, namely weapons are not involved in the movement, but the three fighters are adjusted according to their gender in carrying out the standard movements of the IPSI team. Especially for the art performance itself in the competition, a time limit for performing pencak silat moves has been set, which is 3 minutes/180 seconds.

Physical is the initial factor that supports martial arts and must be trained. Physical exercise has the aim of improving the physical abilities of athletes because excellent physical conditions can support the process of training and competition. The training process requires a physical and technical training program. Physical conditions include the following: strength, speed, agility, endurance, accuracy, balance, flexibility, stamina and power. In the team category, it is not known about the dominant physical exercise. According to [2] basically a fighter in the sparring or art category must have excellent physical condition, especially in the art category, the physical condition will affect the movement of his appearance. In each stance has the movement of hitting, kicking, dodging, jumping, sweeping and cutting. The movement becomes a series of regular movements using energy and fast or slow motion full of soul.

Physical conditions play a very important role in the appearance of motion to produce perfect movement and rhythm. The dominant physical conditions in pencak silat are agility, speed, strength, power, flexibility, balance and endurance. Pesilat's agility is used when dodging or moving from one place to another. Speed is used when performing movements in one move in a short time. Strength and power are used in powerful movements such as hitting, kicking, sweeping, cutting. Flexibility is used for perfect movement. Balance is used in kicks, locks and stances. Endurance is used to perform the movement for 3 minutes continuously. The team category features 100 moves of 12 moves in 3 minutes. When observing the movement of the next squad move, it will be associated with the energy system in each team category move. The team category will require an anaerobic or aerobic energy system. From the brief description of pencak silat above, to determine the physical needs of the team category fighter, it is necessary to analyze to measure the extent to which the athlete's physical readiness to support the movement in the team category, a study was compiled with the title "Physical Needs Analysis of the Pencak Silat Sports Branch in the Regency Team Category. Sukoharjo in 2022". The purpose of this study was to determine the physical condition, the energy system used in each move, and the statistics and average physical needs in the category of the of the Sukoharjo Regency Art Team Team in 2022.

MATERIAL AND METHODS

This research is a quantitative descriptive study with purposive sampling technique. The research was carried out on the campus of UIN Raden Mas Said, Sukoharjo Regency, Central Java in June 2022. The population in this study amounted to 10 martial arts fighters and the number of samples that met the criteria for team fighters were 6 fighters. The tests used in this study were pushups, sit ups, 300 m run, split test, 20 m sprint, triple jump, shuttle run, ball throw, and bleep test. The data analysis technique used in this research is descriptive quantitative with percentage calculation.

RESULTS

The category of team art in the sport of pencak silat requires several components of physical condition including push ups, sit ups, 300 m sprint, side splits, 20 m sprint, triple jump right and left foot, shuttle run, medicine ball throw, bleep test. (MFT). The following table shows the results of the physical condition test and energy system analysis:

Table 1. Physical test

Respondent	Push up	Sit up	Sprint 300 m (s)	Side splits (cm)	Sprint 20 m (s)	Triple jump		Shuttle run (s)	Medicine-ball throw (m)	MFT
						right (m)	left (m)			
Resp.-01	66	62	38.73	2	4.35	7.35	7.05	12.82	7.70	10(1)
Resp.-02	61	58	34.83	4	3.73	8.1	7.5	13.43	8.30	9(10)
Resp.-03	53	60	37.45	0	4.02	7.2	7.75	13.37	7.00	10(6)
Resp.-04	34	41	42.99	9	3.97	4.7	4.65	15.21	5.40	6(5)
Resp.-05	40	45	45.09	7	4.45	5.57	5.53	15.46	6.00	6(5)
Resp.-06	39	38	48.59	13	4.39	4.85	5.3	13.22	5.10	6(2)

Table 2. System of energy analysis

Time (s)											
Jurus I	Jurus II	Jurus III	Jurus IV	Jurus V	Jurus VI	Jurus VII	Jurus VIII	Jurus IX	JurusX	Jurus XI	Jurus XII
9	8	7	7	7	7	7	11	12	6	12	11

From the table above, it can be described the average time energy system of each move used in team art to display the Movement. The first move, before the gong is sounded, perform the opening salute. After the gong is sounded immediately perform the first move. This movement has 7 movements with the estimated time in doing this first move of approximately 9 seconds. The second move, before doing the moves there is an interval in which the interval takes about 10 seconds to regulate the breath before entering the second move. This stance has 7 movements with an estimated time of doing the movement of approximately 8 seconds. The third move, before doing the third move there is an interval of approximately 10 seconds. In this third move, there are 7 movements where the estimated time in doing these moves is approximately 7 seconds. The fourth move, before doing the moves there is an interval motion with approximately 10 seconds. In this fourth move, there are 8 moves with an estimated time of 7 seconds from 3 minutes/ 180 seconds. Usually, in the final movement, this fourth move becomes a reference in the first minute of the game. The fifth move, before entering the move, there is an interval of approximately 6 seconds. In the fifth move there are 8 moves with an estimated time of approximately 7 seconds. In this stance, it is usually known to enter the beginning of the second minute. The sixth move, there are 7 moves in this move which uses an estimated time of 7 seconds. The seventh move, there is an interval before entering the movement of the move which takes time in the interval of approximately 5 seconds. In this move there are 6 movements using an estimated time of approximately 7 seconds. The eighth move, there is an interval before this move that takes about 6 seconds. in this move there are 5 movements whose estimated time is approximately 11 seconds. After doing the moves, there is an interval of motion again with approximately 17 seconds to regulate the breath as the interval between the second minute moves to the third minute moves. The ninth move, in this move there are 8 movements where the estimated time in making the move is approximately 12 seconds. The tenth move, in this move there are 3 movements, it can be said that the movement is a little in each of its moves. The estimated time to perform this tenth move is approximately 6 seconds. The eleventh move, before entering into the stance there is an interval of approximately 7 seconds. In this move there are 7 moves with an estimated time of approximately 12 seconds. The twelfth move, before doing the last move there is an interval motion with a time of 5 seconds. In this move there are 7 moves that require an

estimated time of 11 seconds and the move has been completed and ended with respect to the jury and the head of the match.

Research results are also presented in the form of descriptive data. Based on the table 3, the average push up test results are 48.83; sit ups 50.66; sprint 300m 41.28; split test 5.83; sprint 20m 4.25; triple jump right 6.29; triple jump left 6.29; shuttle runs 14.25; ball throw 6.58; and MFT 218.16. The following is a descriptive analysis of the test in research:

Table 3. Descriptive statistic

Test	N	Min	Max	Mean	St. Dev
Push up	6	34	66	48.83	13.07
Sit up	6	38	62	50.66	10.5
Sprint 300m	6	34.83	48.59	41.28	5.17
Split test	6	0	13	5.83	4.79
Sprint 20m	6	3.73	4.45	4.15	0.28
Triple jump (right)	6	4.70	8.10	6.29	1.43
Triple jump (left)	6	4.65	7.75	6.29	1.29
Shuttle run	6	12.82	15.46	14.25	1.16
Ball throw	6	5.10	8.30	6.58	1.28
MFT	6	62	910	218.16	339.48

Data in the table 4 shows that the components of the physical condition of the push-up items 3 male athletes (50%) are categorized as very good and female athletes (50%) are categorized as moderate. Data in the table 5 shows that the components of the physical condition of the sit up items 3 male athletes (50%) are categorized as very good and female athletes (50%) are categorized as very good.

Table 4. Frequency of push up test

Interval	Frequency	Persentase	Criteria
Men			
>46	3	50%	Very good
36-46			Good
26-35			Moderate
16-25			Less
<16			Very less
Women			
>35			Very good
25-35			Good
15-24	3	50%	Moderate
5-14			Less
<5			Very less
Total	6	100%	

Table 5. Frequency of sit up test

Interval	Frequency	Persentase	Criteria
Men			
>41	3	50%	Very good
30-40			Good
21-29			Moderate
10-20			Less
<10			Very less
Women			
>28	3	50%	Very good
20-28			Good
10-19			Moderate
3-9			Less
<3			Very less
Total	6	100%	

Table 6. Frequency of split test

Interval	Frequency	Persentase	Criteria
Men			
3-0	2	33 %	Very good
8-3.25	1	17%	Good
17.50-8.25			Moderate
22.50-17.75			Less
Above-22.75			Very less
Women			
2.7-0			Very good
7.50-3	1	17 %	Good
16.75-7.75	2	33 %	Moderate
21.50-17			Less
Above-21.75			Very less
Total	6	100%	

From the table 6 above shows that the components of the physical condition of men on the Split Test item 2 athletes (33%) are categorized as very good and 1 athlete (17%) is categorized as good. In women, it shows that 1 athlete (17%) is categorized as good. while 2 athletes (33%) were categorized as moderate. Data in the table 7 below shows that the components of the physical condition of the 20 M Sprint item, both male and female, are in the less category.

Table 7. Frewuency of sprint test 20m

Interval	Frequency	Persentase	Criteria
Men			
<2.78 s			Very good
2.32 - 2.76			Good
2.76 - 3.16			Less
>3.17	3	50%	Very less
Women			
<3.03			Very good
3.04 - 3.35			Good
3.36 - 3.64			Less
>3.65	3	50%	Very less
Total	6	100%	

Table 8. Frequency of triple jump test

Interval	Right	Persentase	Criteria	Left	Persentase
Men					
>7.46	1	17%	Excellent	2	33%
7.0 - 7.45	2	33%	Very good	1	17%
6.0 - 6.99			Good		
5.0 - 5.99			Enough		
<4.99			Not enough		
Women					
>6.46			Excellent		
6.0 - 6.45			Very good		
5.0 - 5.99	1	17%	Good	2	33%
4.0 - 4.99	2	33%	Enough	1	17%
<3.99			Not enough		
Total	6	100%		6	100%

From the table 8 above, it shows that the components of the physical condition of the Right and Left Leg Triple Jump items. For Right Foot Triple Jump, it is known that 1 athlete (17%) is categorized as Perfect. Furthermore, that 2 athletes (33%) were categorized as Very Good. For Left Foot Triple Jump, it is known that 2 athletes (33%) are categorized as Perfect and 1 athlete (17%) is categorized as Excellent. For women, it is known that Triple Jump Right Leg, 1 athlete (17%) is categorized as Good and it is also known that 2 athletes (33%) are categorized as Enough. Furthermore, in Triple Jump Left Foot, it is known that 2 athletes (33%) are categorized as good and 1 athlete (17%) is categorized as enough.

Table 9. Frequency of shuttle run test

Interval	Right	Persentase	Criteria
Men			
<12.10			Very good
12.11-13.53	3	50%	Good
13.54-14.96			Moderate
14.98-16.39			Less
>16.40			Very Less
Women			
<12.42			Excellent
12.43-14.09			Very good
14.10-15.74	3	50%	Good
15.75-17.39			Enough
>17.40			Not enough
Total	6	100%	

The table 9 shows that the components of the physical condition of the male Shuttle Run item are known that 3 athletes (50%) are categorized as good and 3 (50%) women are categorized as moderate. The table 10 below shows that the physical condition component of the Ball Throw item is known that 6 athletes (100%) are categorized as Perfect. Data in the table 11 shows the components of the physical condition of the male Multi-Stage Running (MFT) that 3 athletes (50%) are categorized as above average and 3 female athletes (50%) are categorized below average.

Table 10. Frequency of ball throw test

Interval	Frequency	Persentase	Criteria
>4,04	6	100 %	Excellent
3,52 - 4,03			Very good
2,95 - 3,51			Good
2,38 - 2,94			Enough
1,81 - 2,37			Not enough
Total	6	100 %	

Table 11. Frequency of MFT test

Interval	Frequency	Persentase	Criteria
Men			
>52,6			Superior
49,3 - 52,5			Excellent
43,9 - 48,7	3	50 %	Above average
39,9 - 43,3			Average
33,0 - 39,2			Below Average
<33,0			Bad
Women			
>50,2			Superior
45,2 - 49,4			Excellent
42,4 - 44,9			Above Average
36,5 - 41,9			Average
31,5 - 35,7	3	50 %	Below average

DISCUSSION

Based on statistical calculations related to the analysis of physical needs in team category pencak silat athletes. The following is a discussion of the data obtained from the research data:

1. To find out the physical needs in the team category of pencak silat to improve performance in the team category including, Push Ups for arm muscle strength, Sit Ups for abdominal muscle strength, Sprint 20 meters to measure speed, Shuttle Run to measure agility, Side Split to measure flexibility, Triple Jump right and left for

leg power ability, Medicine Ball Throw for arm power ability, Run (Sprint) 300 meters for anaerobic endurance, Bleep Test (MFT) to measure aerobic endurance.

2. In the energy system required in the category of team moves between anaerobic and aerobic, namely 40:60. According to that in a pencak silat competition takes place, an anaerobic energy system is still needed even though it is relatively small compared to the aerobic energy system. One aspect of knowing the energy system of a sport is by looking at the length of time it works. Overall, the total time in the performance of the team category in pencak silat is 180 seconds. With details, in the first move to the fourth move along with the interval in each move it takes 61 seconds. This means that the average time in 1 minute and 1 second is that the fighter is able to perform all four moves out of the total. Furthermore, in the fifth move to the eighth move along with the interval in each move it takes 66 seconds. This means that the average time in 1 minute and 6 seconds for a fighter to perform all four moves out of the total moves. In the second minute the coach gives a code for the performance at the interval that is appropriate or not related to the movement or rhythm being too fast or slow. The last one in the ninth to the twelfth moves and the intervals for the fighter takes 53 seconds. If in doing the moves or the average interval with a time of 6 seconds the energy system used is the ATP energy system without the help of other energy according to [3]. But if it is done with an average time of 10 seconds using the ATP energy system with the help of Phospho Creatin (PC). However, if you do a move for more than 10 seconds, the energy system used needs a glycolysis system to extend muscle work for about 120 seconds. Furthermore, in carrying out a full stance with a time of 180 seconds the energy system used needs oxygen (O₂) assistance through the respiratory system. This energy system is called the aerobic energy system which is able to work more than 180 second.
3. The following is an analysis of statistical data related to the physical needs needed in the category of pencak silat squad:

- a. The power of arm.

To determine the strength of the arm muscles, researchers used the Push Up test instrument. The results of the data above illustrate that the category of the Sukoharjo Regency art team team obtained an average score of 3 samples of men belonging to the very good category and 3 women belonging to the medium category. The sport of pencak silat tends to use muscles in training sessions and during competition, because by having good strength a fighter is easier to display his moves and reduce the occurrence of injuries. According to [4] the need to have a high level of muscle from bottom to top and muscle strength in dynamic and isometric movements. To increase the strength of the arm muscles, team category fighters can do exercises using Push Ups, Pull Ups, and others.

- b. The power of abs muscle

To determine the strength of the abdominal muscles, researchers used the Sit Up test instrument. The results of the data above illustrate that the category of the Sukoharjo Regency art team team obtained an average score of 3 samples of men belonging to the very good category and 3 women belonging to the very good category. The sport of pencak silat tends to use muscles in training sessions and during competition, because by having good strength a team category fighter is easier to move in his stance and reduces the occurrence of injuries. According to [4] the need to have a high level of muscle from bottom to top and muscle strength in dynamic and isometric movements. To increase the strength of the abdominal muscles, team category fighter can do spiderman plank crunch, cable rotation and bicycle crunch exercises.

- c. Endurance of Sprint 300m

To determine the anaerobic capacity, the researchers used the Sprint 300 m test instrument. The results of the data above illustrate that the category of the Sukoharjo Regency art team team obtained an average score of 3 samples of men belonging to the very good category and 2 women belonging to the good category and 1 woman belonging to the medium category. Anaerobic endurance or called stamina is a level of endurance that is higher in degree than endurance, stamina work is work at an anaerobic level, where the supply or intake of oxygen is not

sufficient to meet the needs of the work performed by the muscles [5]. To increase the anaerobic endurance of team category fighters, they can do the 300 m run, 400 m run and intervals.

d. Flexibility

Instrument. The results of the data above illustrate that the team category obtained an average score of 2 male samples belonging to the very good category, 1 male belonging to the good category and 1 female sample belonging to the good category, 2 female samples belonging to the medium category. Flexibility or flexibility is the ability of the joints to perform a movement optimally [6]. With the support of good flexibility, a team category fighter can perform punches, kicks and cuts.

e. Speed

To find out the speed in the team category, the researcher used the 20m Sprint test instrument. The results of the data above illustrate that the team category obtained an average score of 3 male samples belonging to the less category and 3 female samples belonging to the less category. Pencak silat is a sport that uses high speed and uses explosive muscle power [7]. Because when doing attacks, be it kicks, punches, cuts or other techniques, you have to do it quickly. To increase speed, athletes can perform exercises such as squats, single leg squats, 20 m sprints, 30 m sprints.

f. Power of leg

To determine the leg muscle power in the team category, the researcher used the Triple Jump test instrument. The results of the data above illustrate the triple jump on the right and left feet. For the right foot triple jump, the team category obtained an average score of 1 male sample belonging to the perfect category, 2 male samples belonging to the very good category and 1 female sample belonging to the good category, 2 female samples belonging to the sufficient category. As for the left foot triple jump, the average value of 2 male samples is in the perfect category, 1 male sample is in the very good category and 2 female samples are in the good category, 1 female sample is in the sufficient category. Pencak silat is a sport that requires leg power combined with good speed to produce a perfect kick. In the journal [8]. power is a fast movement that combines strength with speed and exerts all its strength. To further increase the leg power of team category fighters, they can perform exercises using up and down stairs, squat jumps, and calf raises.

g. Agility

To determine agility in the team category, researchers used the Shuttle Run test instrument with a distance of 5 meters and ran back and forth 5 times. The results of the data above illustrate that the team category obtained an average score of 3 male samples belonging to the good category and 3 female samples belonging to the sufficient category. Agility is the skill of a movement to change body position quickly which is carried out simultaneously [6]. Agility is an unexpected change in the direction of movement. To improve agility, team category fighters can perform exercises such as shuttle run, zig zag, ladder drill, and others.

h. The power of arm muscle

To determine arm muscle power in the team category, the researcher used the Medicine Ball Throw test instrument. The results of the data above illustrate that the team category obtained an average score of 3 male samples belonging to the perfect category and 3 female samples belonging to the perfect category. Pencak silat is a sport that requires arm power combined with good speed to produce a perfect shot. As stated by [5] in the journal [8] power is a fast movement that combines strength with speed and exerts all its strength. To further increase the strength of the fighter's arm power, you can do exercises using Pul Ups, Push Ups and Chin Ups.

i. VO2Max

To determine the aerobic capacity or vo2max in the team category, the researcher used the MFT test instrument. The results of the data above illustrate that the team category obtained an average score of 3 male samples belonging to the above-

average category and 3 female samples belonging to the below-average category. Because basically fighters who are prepared to take part in the championship must have excellent endurance so that they can perform movements with high intensity and are not easily fatigued, according to [6]. Endurance is the ability of the heart and lungs and blood vessels to function properly. optimally when carrying out daily activities without experiencing significant fatigue. To further increase heart and lung endurance, team category fighters can do Fartlek exercises, long- distance running, swimming [9].

CONCLUSION

The physical condition components of Push Up, Sit Up, Sprint 300 m, Side Splits, Sprint 20 m, Triple Jump, Shuttle Run, Medicine Ball Throw and Multistage Fitness Test (MFT) can support the physical needs of the team category pencak silat. The team category fighter displays a whole series of moves to finish or a full game with an average time of 180 seconds, then the energy system used is an aerobic energy system that requires oxygen through the respiratory system, this system can work more than 180 seconds.

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CONFLICTS OF INTEREST

Conflict of interest : Authors state no conflict of interest.

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REFERENCES

1. Sundara C, Meirizal Y, Hambali S, Jasmani P, Silat P. Kondisi fisik atlet pencak silat pplp jawa barat. 2020;19(April):74–82.
2. Olahraga S-PK, Olahraga FI, Surabaya UN, Wahyudi AR, Pd S, Pd M. Muhammad Reza Al Muttaqin.
3. Afriwardi. Interaksi Holistik Antara Organisme dan Lingkungan Untuk Kualitas Hidup Yang Lebih Baik. 2015;
4. Spanias C, Nikolaidis PT, Rosemann T, Knechtle B. Anthropometric and Physiological Profile of Mixed Martial Art Athletes: A Brief Review. Sports. 2019;
5. Harsono. Latihan Kondisi Fisik. 2001;
6. Widiastuti. Tes dan Pengukuran Olahraga. 2015.
7. Kostikiadis IN, Methenitis S, Tsoukos A, Veligeas P, Bogdanis GC. The Effect of Short-Term Sport-Specific Strength and Conditioning Training on Physical Fitness of Well-Trained Mixed Martial Arts Athletes. 2018;(May):348–58.
8. Hasanudin. Pengaruh latihan power tungkai terhadap keterampilan tendangan lurus pada olahragara pencak silat. 2014;321–30.
9. Syamsudin F, Syaifullah R, Subardi MB, Fariz S. Interval Training and Endurance Training to Increase VO₂max: Article Review. JUARA J Olahraga [Internet]. 2021 Apr 25 [cited 2021 Dec 28];6(2):188–97.