The Physiology and Psychological Condition of Indonesia’s Elite Pencak Silat Athletes

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Abstract

Introduction: Pencak silat is a martial arts sport and is one of the national cultures of Indonesia. This research refers to the Pencak silat sports' success at the 2019 Asian Games by obtaining 14 gold medals and one bronze medal and placing Indonesia in fourth place. This achievement is a new history for Indonesia and especially for the martial arts sport. Martial arts, in particular, Pencak silat is identical to physical contact, so the researchers concluded that athletes are required to have the right physical conditions, to avoid injury. This injury factor can put pressure on the athlete's psychological condition. Based on these interrelationships, these two factors complement each other to support the athlete's best performance. Psychological factors are critical in improving the performance of athletes.

Objectives: This study provides an overview of the relationship between athletes' physical and psychological conditions on the achievements of athletes.

Method: The method used in this study is descriptive analysis. In contrast, the data is the test results of the athlete's physical conditions and psychological conditions. The sample used was all Pencak silat national athletes consisting of 13 male athletes and nine female athletes (9 match category athletes and 12 artistic category athletes).

Results: The study results concluded that physical conditions are not the main factor, but the presence of psychological factors that play an essential role in helping athletes top their best performance.

Conclusion: This study provides the conclusion that low physical conditions tend to weaken the athlete's psychological condition.

Keywords: Pencak Silat; Physiology; Psychology; Sport Exercise.

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INTRODUCTION

Pencak Silat is a traditional sport originating from Malay, the Southeast Asian region (1). Pencak silat now transformed into a modern sports competition at various national and international levels. Pencak silat has hosted 18 World Pencak Silat Championships. The Pencak silat world championships were first held in 1982 in Jakarta, Indonesia, with seven participating countries. Meanwhile, it was held in 2018 in Singapore, with 40 participating countries. The increase in the number of participating countries shows that Pencak silat is well known to the world.
In 2018, Pencak silat's sport successfully competed at the Asian Games event held in Jakarta, Indonesia. At this event, Indonesia was able to become the overall champion in martial arts, with the acquisition of 14 gold medals and one bronze medal. The numbers competed in the event were category B male / female (50kg-55kg), C male / female (55kg-60kg), D male / female (60kg-65kg), E male (65kg-70kg), F male. (70kg-75kg), H sons (80kg-85kg), and I sons (85kg-90kg). The numbers contested in the art category include men's and women's singles, men's and women's doubles, men's and women's teams.

Psychological factors and physiological factors affect the performance of athletes to achieve their achievements (2). The physical condition of athletes plays a crucial role in meeting the training needs to achieve optimal performance (3), one of which is endurance (4). Endurance itself plays an essential role in increasing the ability of the circulatory system and the work of the heart. Other physiological functions will have a direct impact on the physical condition of the athlete (5). If the oxygen supply is insufficient to meet the strenuous exercise, then anaerobic endurance training still requires aerobic exercise to continue doing the exercise (6).

The flexibility ability possessed by an athlete will cause the technique to be inefficient and will cause muscle tearing if the stimulus exceeds the muscle tension capacity; this condition will cause the athlete's performance to be unsatisfactory and lead to injury to the athlete (7). Inadequate flexibility will not increase speed and endurance. Not optimal flexibility forces the muscles to work harder to perform dynamic and long-lasting motion activities. This condition hurt mastery of movement techniques in Pencak silat. The impact of flexibility results in the athlete's performance to be louder and longer. However, keep in mind that increased flexibility will not do much good if it is not accompanied by increased muscle strength.

In Pencak silat sport, agility plays an essential role in improving athlete performance. Movement techniques to avoid attacks from opponents require agility. In performing movement techniques, athletes must not lose balance and be aware of their body position (8). Movement efficiency requires agility by utilizing the opponent's movements to gain points. The combination of agility and flexibility will promote good mobility (9).

Strength will influence general sports skills, especially sports that require high agility and mobility and minimize injuries to athletes (10). Sports that require strength require high anaerobic capacity (11). Taekwondo martial arts are similar to Pencak silat, which requires high aerobic and anaerobic activities (12). The VO2max needs of athletes during the 3-minute competition cause lactate in the blood; this shows the importance of aerobic metabolism in taekwondo martial arts.

Psychological factors significantly affect athlete performance because they can damage athletes’ physiological aspects (13). The match arena always presents conflict, anxiety, and mental. Athletes with the excellent physical condition will not guarantee a victory when they cannot manage anxiety, especially in martial arts, which requires physical contact. The psychology of the athlete influences physical contact in the sport of Pencak silat. Anxiety often occurs in athletes who have low skills, rather than athletes who have high skills (14). The imbalance between the goals that athletes want and the ability to fulfill them will impact the failure to achieve goals (15). The higher the level of competition followed by the athlete, the higher the athlete (16). Research related to psychological aspects, especially anxiety, which does affect athletic performance, has been conducted by this study showing that there is a relationship between anxiety and athlete performance so that the athlete's performance is affected by the athlete's anxiety level (15).

This article describes elite Indonesian Pencak silat athletes’ conditions based on psychological and physiological conditions. So far, research on Pencak silat is still lacking, so achievement indicators are not clearly defined. Physiological and psychological theories use research results in similar martial arts, such as taekwondo, wrestling, and karate. Based on these limitations, it is necessary to formulate indicators of achievement of peak performance of
Pencak silat athletes. This indicator of achievement is needed to become a benchmark for the development of elite Pencak silat athletes.

METHOD

This research’s object is the elite athletes of Indonesian Pencak silat with details of 9 female athletes and 14 male athletes. All athletes are the result of selection from the national level from various regions in Indonesia. This research method uses descriptive qualitative. The data to be obtained from this research is psychological condition data. To obtain psychological data, the researcher used The Athletic Coping Skill – 28 (ACSI-28) questionnaires, after which an interview was conducted to confirm the results of questionnaire. Data on the physiological condition of athletes is obtained from the document archive of national pencak silat coaches. The data analysis technique used was NVivo12 which aims to obtain a conclusion on the psychological condition of the athlete. While the physiological condition is the data needed to support the athlete’s performance.

RESULT

Physical Condition of Male Athletes, Art Category
Max average. The power produced by the athletes in the male art category is 552.67 watts, which indicates that the training was not achieved (<600 watts); only one athlete achieved the expectation. Minimum average. The resulting power is 419 watts > 400 watts with the expected status of the training achieved, and only one athlete does not meet expectations. The average power obtained was 480 watts <500 with the expected status of the training not achieved; only one athlete achieved the expectation. The ability of fatigue index 4.17 > 4 with the expected status from training was not achieved; only three athletes achieved the expectations. The leg ability in the Hurdle Side Jump, which is carried out for 2 minutes, is 201 reps > 160 reps with the expected status of the exercise has been achieved. Burpee test averaged 18 <20; it indicates that the exercise was not as expected. The arm's physical ability on a medicine ball obtained 4.31 m <5.10 m with the expected status of the exercise not being achieved. The right leg's triple hop ability gained 7.25 m, and the left leg was 7.04 m, with the expected status of the exercise not being achieved less than 7.50-7.99 m. The dash sprint ability gets 3.04 sec > 2.27-2.32, with the training's expected status not achieved. The ability of lactic anaerobic power obtained 44.01 with the expected status of the exercise has been achieved. The ability to obtain aerobic capacity is 56.97 ml/kg/min, with the expected status.

Diagram 1

Diagram of Average Physical Conditions
Physical Condition of Female Athlete Art Category
Max average. The resulting power is 309.5 watts with the expected status of the training not achieved because <400; only one athlete has achieved the expectation. Average min. The power generated is 212 watts <250 watts with the training’s expected status not being achieved. The average power obtained is 250.6 watts <300, with the training's expected status not achieved. Ability fatigue index 2.61 <4 with the expected status of training has been achieved. The Hurdle Side Jump's leg ability, carried out for 2 minutes, is 170 reps > 150 reps with the expected status of the training being achieved, even though one athlete does not match expectations. The arm's physical ability on a medicine ball obtained 3.05 m <400 m with the expected status of the exercise not being achieved. The right leg’s triple hop ability gained 5.88 m, and the left leg was 5.8 m with the expected status from training not being achieved less than 6.46 m. The dash sprint ability gained 3.45 sec with the expected status of the training not being achieved, and only one athlete achieved the expectation. The ability of lactic anaerobic power obtained 54.21 with the expected status of training has been achieved. The ability to obtain aerobic capacity is 41.05 ml/kg/min with the status not achieved; only two athletes meet expectations.

Physical Condition of Male Athletes in Competing Category
Max average. The power generated is 731 watts, with the expected status of training > 600 watts, only one athlete is not in line with expectations. The average min power generated is 468.14 watts > 400 watts with the expected status of training achieved, even though the two athletes did not match expectations. The average power obtained was 581.71 watts > 500 with the expected status achieved, even though the two athletes did not match expectations. The ability to fatigue index 8.22 > 4 with the expected status from training is not achieved. The Hurdle Side Jump's leg ability, carried out for 2 minutes, is 182 reps > 160 reps with the expected status of the exercise being achieved. The arm's physical ability on a medicine ball obtained 4.95 m <5.10 m with the expected status of the exercise not being achieved. The right leg’s triple hop ability gained 7.38 m, and the left leg was 7.48 m with the expected status from training not being achieved less than 7.50-7.99 m, only two athletes who matched expectations. The dash sprint ability gains 3.11 sec with the expected status of the training not being achieved. The ability of lactic anaerobic power obtained 43.47 seconds with the expected status of training has been achieved. The ability to gain aerobic capacity is 55.82 ml/kg/min with the expected status achieved, even though the three athletes did not meet expectations.

Physical Condition of Female Athletes in Competing Category
Max average. The resulting power is 452 watts, with the expected status of the training being > 400 watts. The minimum power generated is 318 watts > 250 watts with the expected status achieved. The data also shows that the average power obtained is 381.67 watts > 300, with the expected status. Ability fatigue index 3.89 < elite athlete achieves 4 with the expected status of the exercise. The leg ability in the Hurdle Side Jump, carried out for 2 minutes, was 174.67 reps > 150 reps with the expected status of the training being achieved. The arm's physical ability on a medicine ball obtained 3.51 m <4 m with the expected status of the exercise not being achieved. The right leg’s triple hop ability obtained 6.29 m and the left leg 6.5 m with the expected status of the exercise not being achieved less than 6.46 m. The dash sprint ability gains 3.25 sec with the expected status of the training being achieved. The ability of lactic anaerobic power obtained 47.18 sec with the expected status of training has been achieved. The ability to obtain aerobic capacity is 50.9 ml/kg/min, with one athlete's status not being achieved.

Psychological Conditions of Athletes
The survey results showed that the descriptive ACSI-28 data had a standard deviation of 5.209 with a minimum value of 63, while the maximum value was 79, with an average of 68.86.
### Table 5

<table>
<thead>
<tr>
<th>ACSI-28 data description</th>
</tr>
</thead>
<tbody>
<tr>
<td>N</td>
</tr>
<tr>
<td>---</td>
</tr>
<tr>
<td>ACSI</td>
</tr>
<tr>
<td>Valid (listwise)</td>
</tr>
</tbody>
</table>

Meanwhile, the data frequency shows that none of the sample groups in the study got poor results. Eleven people indicate that the results are in the interval class 63-67 with the GOOD category. Meanwhile, for the GOOD ONCE category, there were five people. Then for the ENOUGH category, there are two people. This result shows that the average athlete who competes in the Asian Games shows useful psychological condition data.

### Table 6

<table>
<thead>
<tr>
<th>Interval Class</th>
<th>Frequency</th>
<th>Category</th>
</tr>
</thead>
<tbody>
<tr>
<td>55-59</td>
<td>0</td>
<td>Low/Less</td>
</tr>
<tr>
<td>59-63</td>
<td>2</td>
<td>Medium/Adequate</td>
</tr>
<tr>
<td>63-67</td>
<td>11</td>
<td>High/Good</td>
</tr>
<tr>
<td>67-73</td>
<td>5</td>
<td>Very High/Very High</td>
</tr>
</tbody>
</table>

The ability to solve problems is one of the first things needed for a Pencak silat athlete. One way athletes generally solve problems during competition is by asking the coach for directions by glancing. Besides, always receiving suggestions and opinions from the coach is an effort to fix shortcomings. That is what makes the role of the coach/official critical when the match takes place. The harmony of the relationship between the coach and the athlete is one reason athletes maintain their best performance. Every athlete always expects a coach/official figure who understands the character of each athlete. Some athletes resent being ruled by a coach or are silent about criticism of their competitive performance.

Nevertheless, in general, every athlete considers that the coach's role is crucial. The athlete considers that without the coach's guidance, the athlete does not know the advantages and disadvantages that the athlete does when competing. Regardless of the importance of the coach's role, the athlete's ability determines his best performance. One thing that athletes need to do to optimize performance when competing is to solve external and internal problems before the competition. So that when training and in championships, athletes can focus on the competition. A conducive environment during training has an impact on the optimal training program given by the trainer. One of the habits that athletes need to avoid is mixing up personal, family, and team life; this can focus the athlete on achieving his best performance. The ability of athletes must have a priority scale in every problem that must be solved, so it keeps athletes focused on training and competition. Staying positive is one way to avoid problems that arise in athletes.

Being able to control emotions is one that Pencak silat athletes must have. Stay focused on the strategy being applied, not overly thinking about the opponent's abilities. What athletes need to do is focus on the abilities they have. Thinking of an opponent will put pressure on the athlete, resulting in excessive anxiety. In general, every athlete tries to exert pressure on the opponent. The stressed position harms the athlete's performance. Every athlete must have a feeling of optimism to win, and it will give an idea of the athletes' fighting abilities when competing. Besides, athletes must understand the meaning of losing and winning. The feeling of nervousness when competing always approaches every athlete. The efforts made by athletes to cover their shortcomings are by competing aggressively. Self-motivation used to reduce excessive anxiety will harm performance when competing. Strive to be...
realistic between abilities and achievement targets. External motivation is a factor in the success of athletes in achieving, namely family. One way to motivate athletes is the self-talk that they can get the highest achievement.

On the eve of the match day, all the athletes felt anxious. However, the feeling of anxiety disappeared when the athlete set foot on the arena. Patience and the ability to control emotions are essential for a martial artist. The inability to control emotions when competing will harm the athlete's performance. The role of the coach, apart from playing strategy, is to control athletes' behavior when competing. When an out-of-control athlete cannot control his emotions, the coach acts to remind him. Self-talk is the easiest thing any athlete can do to relieve anxiety. Besides, listening to music is another way to reduce feelings of anxiety in athletes before competitions. An indicator that an athlete has a strong mentality to excel is having realistic target achievement and programming training. Every athlete has a training program outside the training center to improve his abilities. Every time the athletes face a technique, always prepare the techniques and strategies used when competing.

Every athlete thinks that he never thinks about his opponent; the most important thing is to focus on his appearance. Every athlete considers that training is an obligation to becoming a champion. Without prompting and pressure from others, the athletes will continue to train. In general, athletes like a challenge and enjoy every challenge. Challenges teach athletes to solve a problem quickly and with good results.

**DISCUSSION**

This study provides findings that elite Pencak silat athletes have different physical and psychological conditions. There is a difference between the power possessed by athletes in the art category and the competition category. When viewed from the differences, the sparring category has a higher RAST. This shows that athletes in the competition category must have a high RAST output, because athletes in the competition category need to compete for 3 rounds (17). Researchers found that high Vo2 Max does not have a significant impact on the power generated by athletes. However, further research is needed to see the relationship between Vo2max and the power produced. The next finding is that the anaerobic ability of the art category athletes is higher than the sparring category athletes' anaerobic ability. However, both the competition category and the art category of anaerobic and aerobic abilities have been achieved as expected. It can be concluded that anaerobic and aerobic capacities are very much needed in the sport of martial arts so that the sport of Pencak silat can be called a sport that uses anaerobes and aerobes (18).

The average physical condition of the athletes is not as expected. This condition can result from too high training expectations or psychological factors that an outstanding athlete has. Psychological factors greatly support the performance of an athlete (19). Based on descriptive data from a psychological condition survey with the ACSI-28 test, the average category is High/Good. This result shows that the average athlete's psychological condition can think positively and enthusiastically even when things are going badly, remain calm and in control, and quickly bounce back from mistakes. The average athlete can work well and think clearly when under pressure. The average athlete sets and tries to achieve maximum result goals have a mental plan and is in the face of a match. The average athlete can focus on his goals, even when adverse or unexpected situations occur. The average athlete can play without pressure, despite external pressure. Besides, athletes' level of confidence in their abilities has a positive impact on performance when competing, so they can work hard to achieve their best performance. Athletes can be open to learning from mistakes and accept figures from the coach and accept all coach figures.

**CONCLUSION**

This article still needs improvement considering the limited time, funds, and material needed to discuss Pencak silat's sport. Some of the shortcomings of this article are the research method used, research data, the absence of treatment, the instruments used in the research need to be developed again to improve.
REFERENCES


