

Literature Study: Development of Pencak Silat Measurement and Evaluation Test Instruments

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Abstract. Instruments as objective measuring instruments in evaluating exercise results. The improvement in the performance of martial arts athletes is always measured by a test instrument. So far from searching on *google scholar*, there have been many articles published in the development of martial arts instruments. Interpretation of results from literature studies shows mixed results. This literature study aims to find, critically assess, and analyse the results of the development of pencak silat test instruments. The keywords used in the database are the development of pencak silat instruments published within the last 5 years from the period 2019 to 2023. The method used in completing the literature study uses PRISMA guidelines with four stages, namely *identification*, screening, *eligibility*, and *inclusion* and the database is taken from *google scholar*. Conclusion making is conducted qualitatively. The database is systematically analyzed to search for relevant studies. Articles are filtered independently, and data is obtained through data extraction forms. There are six articles showing the relationship with the development of martial arts test instruments. The main finding of the literature study is the difference in the validity and reliability results of each test instrument developed. This is due to differences in the characteristics of martial arts athletes as subjects in the study. Therefore, it is necessary to reconstruct the research and development of pencak silat test instruments with validity and reliability that can be used in generalization.

Keywords: Test instrument; Pencak Silat; Validity; Reliability

INTRODUCTION

Development in sports coaching must be conducted in a directed, tiered, and sustainable manner by the principles of science and technology (Setiawan & Mulyana, 2018). So far, the development and progress of science in the field of sports has progressed quite rapidly, this can be seen from the results of research, studies, articles, and journals published have presented the latest information about the development of sports today. This information can be seen from the findings, both in national journals and international journals supplying more information that advances in science and technology in the field of sports contribute a lot to help athletes to excel. Through research, athletes are made the main subject in supporting the advancement of sports science.

Evaluation and monitoring of exercises is a critical issue in martial arts training. The purpose of the evaluation is to decide the extent of the impact of the exercise that has been done. Not planning an evaluation means not planning an exercise program. Because evaluation and training programs are an integral part that cannot be separated in the development of the competence of martial arts athletes. Along with the development of technology and knowledge, various kinds of pencak silat literature have been widely presented in scientific publications. This

signifies that progress in the development of sports science has progressed rapidly. One clear proof of the progress of pencak silat sports is marked by the presence of publications related to the development of pencak silat test instruments.

Coaching in the pencak silat training process, a coach needs to understand the components of physical condition that are by the needs of pencak silat sports, including agility, muscle explosiveness, speed, and endurance, these components are needed in competing (Ridhwan & Hariyanto (2021). In line with that, the needs of the physical condition of pencak silat athletes including explosive power, endurance, strength, agility, and speed will affect best performance (Suwirman et al, 2018). The evaluation and monitoring process is fundamental in measuring the achievement of the exercise program. Instruments as a legitimate measuring instrument in deciding the level of success of athletes. However, measuring instruments are said to be valid when they have elements of validity and reliability. Therefore, the level of validity and reliability will affect the results that have been decided in looking at the performance of athletes.

By knowing the results of tests and measurements, it becomes the basis for trainers in deciding and seeing how far the exercise program has been achieved by the goals of the exercise. The main goals and aims of training are to help

athletes to improve their skills and achievements as much as possible. To achieve this, there are 4 (four) aspects of training that need to be considered and trained carefully by athletes, namely physical training, technical training, tactical training, and mental training (Harsono, 2017). To see the achievement of these aspects, it is necessary to evaluate and measure as part of a systematic process to decide or make decisions, to what extent the aims or programs have been achieved.

The purpose of this literature study is to see various articles that have conducted research, publications on the development of pencak silat test instruments and to find, critically assess, and analyse the results of the development of martial arts test instruments. The accuracy of choosing instruments is the main requirement that must be done by coaches to collect and evaluate data about their athletes (Ihsan et al, 2017). So far there have been many instrument development articles published with various instruments used. In addition, from the characteristics of athletes in the use of research and development subjects there are also differences in age, as a result the results that have been found cannot be generalized. A number of authors of the article database also have differences in interpretation and results of validity and reliability.

As well as the development of physical test norms for juvenile pencak silat in the sparring category which consists of 8 test items, namely: flexibility (*sit and reach*), speed (30-meter sprint), arm strength (30-second push-up), *leg strength* (*wall sit test*), agility (side step), *leg power* (standing broad jump), *anaerobic endurance* (sprint) 300 meters), and aerobic endurance (*multy fitness test*), the test was declared valid and reliable with $p < 0.05$ (Saputro & Siswantoyo, 2018). The agility test instrument with a digital basis of expert validation test results with questionnaire assessment so that 91% validity was obtained in the category and the reliability test of the small group of men was 0.997, women were 0.998 and large groups of men were 0.998, women were 0.999 with both reliability categories "High", obtained a practicality value of 88.75% and an effectiveness value of 95% (Sahri, 2020).

Based on the statement above, although the

goal is to produce test instruments, the fact is that the development conducted is not specifically on the needs of martial arts athletes. For example, the development of instruments used by looking at the weighting of each test item is; height 3%, weight 3%, span of both arms 3%, leg length 3%, three hop 6%, run 20 m 8%, multistage fitness test 8%, push-ups 6%, sit-ups 6%, ankle coordination 6%, flexibility 6%, punch 30 seconds 10%, front kick 30 seconds 10%, sickle/bow kick 30 seconds 10% and side kick 30 seconds 10% but for validity used by looking at expert arguments, which is a very high level of subjectivity.

This literature study has a number of arguments why the development of pencak silat test instruments was conducted, a brief review of the results of development, the development of instruments used, and recommendations for further research. Therefore, a systematic review is conducted to assess and critically find the resulting findings and analyse the research findings of the development of pencak silat test instruments on the impact and uses that can be used for martial arts coaches and athletes.

METHODS

The method in this writing uses *Preferred Reporting Items for Systematic Reviews and Meta-Analyses* or referred to as PRISMA (Moher et al., 2009). Search for articles using google scholar database. Article search is conducted by searching for relevant titles, namely the development of pencak silat test instruments. The feasibility of the article must meet the criteria that undertake the development of the instrument and must be from the primary study. Publication limits are applied to filter the latest scientific developments, the publication year is set for the last 5 years from the 2019-2023 period. Article searches are limited to the language used, in this case searches are conducted with Indonesian articles.

Articles are added with the selection process after a database search is performed. After that, filtering of titles, abstracts, and papers that meet the criteria is conducted. Full-text articles are analysed and discussed in scope review (Figure 1).

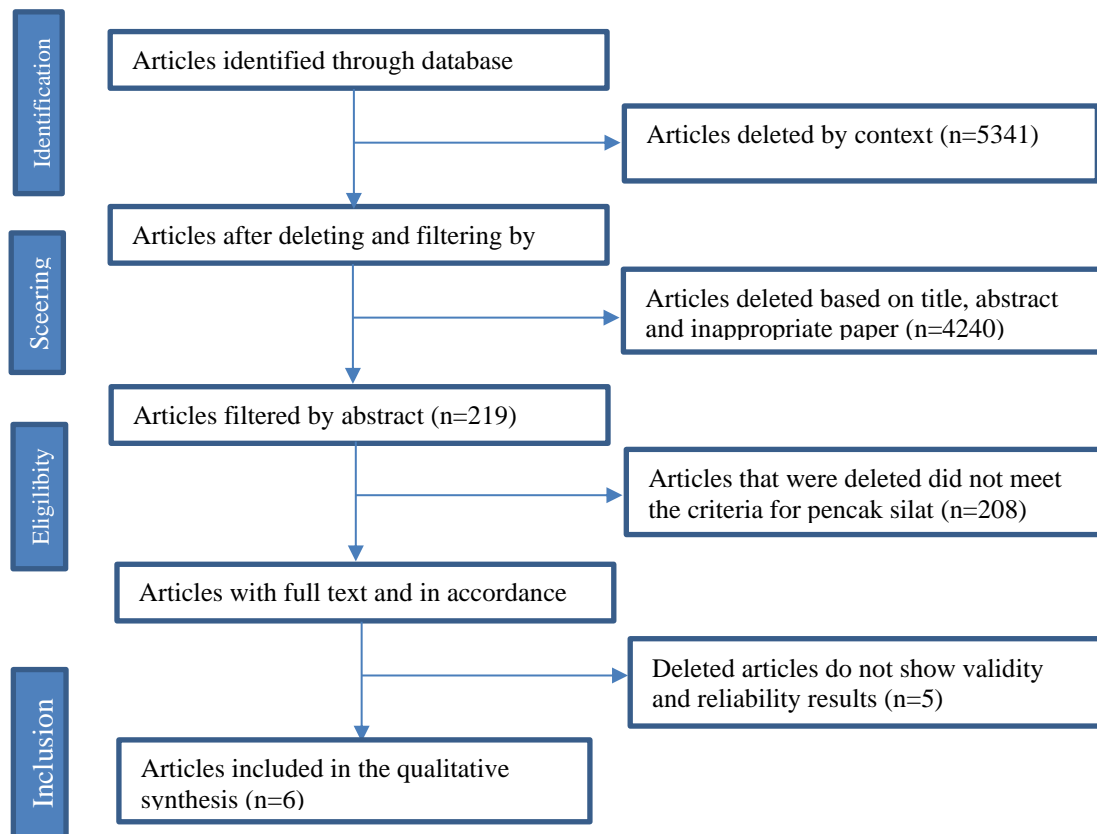


Figure 1. PRISMA flowchart (Moher et al, 2009)

Data extraction is conducted with the aim of selecting parameters, suitability, and feasibility of articles from the data obtained. The results of the literature study by displaying the results of the development of test instruments categorized by title, abstract, and keywords. Because the results of the PRISMA diagram are not uniform, a review of the data and examination of the articles contained by elaborating the results obtained. Conclusions are obtained after qualitative data extraction is conducted.

RESULTS AND DISCUSSION

A total of $n = 9800$ articles that appear in database searches using the keyword development of pencak silat test instruments. Of

these, 5341 articles were removed because they were not based on the expected context. These results resulted in a reduction in articles after filtering to $n = 4459$ articles. However, these results are not enough if there is no screening in the abstract category, so that the screening results there are 219 articles that match the abstract. To ensure the feasibility of the article, data extraction is conducted by pursuing on the article on the development of martial arts instruments. This result was conducted by the study, so that as many as eleven articles were analysed and found. After identification, there were 5 articles that did not display the results of validity and reliability, so that the 5 articles were extracted which in the end there were only 6 articles that were worthy of literature study.

Table 1. Search Final Results

N0	Writer	Year	Test instruments	Result (%)	Category
1	Yolanda, D.E.	2019	Punch Power	97.5	Worthy
2	Shaifullah, R	2019	Push Up, Sit Up, Coordination, Sit & Reach, 3 Hop, Run 20 m, Vo2 Max, Punch, Fore-Crescent-Side Kick	1.98	Valid
3	Son, M. K	2020	Straight Kick	94.44 95.31 93.05	Worthy
4	Mustain, A.Z & Akbar, R	2021	Kick and Punsh Reaction Speed	90.6 91.4 93.7	Worthy
5	Hidayat, S & Haryanto, A. I	2021	Kick Agility	r = 0.96	Reliable
6	Sahri, J	2022	Agility	0.998 0.999	Reliable

The development conducted there are several kinds of test items to measure and evaluate martial arts athletes. Each test item has its own characteristics, as done by Yolanda (2019) with the development of a punch explosive instrument where the sample used was sports students with a total of thirty athletes. The instrument in this development is limited to blow explosive power tests based on the use of technology with sensor media. The results found that 97.5% &, possible for use. A critical review of this finding is that not all pencak silat camps have similar tools, so this results in the ability of each pencak silat camp, this finding also confirms that the results obtained cannot be generalized in general. The development conducted by Syaifullah (2019) took the topic of developing pencak silat aptitude test instruments with a valid category of 1.98 so that it can be said that the instrument can be used in generalization for the age category of 12-14 years. This is because the elements of the test items developed have been widely used and evaluated with population division in eight regions. However, from critical reviews, although it has been declared valid, the test category reflects only talented athletes and untalented athletes. The norms of the measurement test are also not said so that the results are doubtful in the implementation in the field.

Putra (2020) has developed a straight kick test instrument with samples on sports students as many as thirty martial arts athletes. The results of the study were categorized as possible with details of 94.44% media experts, 95.31%, measurement test experts, 93.05% martial arts

experts. Use of instruments with technology-based sensor media. The findings aim to design a technology-based instrument by measuring straight kicks. A critical review of the results is that the martial arts kick is not only straight, but can also be a sickle kick, so that the findings are not integrated with the variations of kicks that exist in martial arts. It should also be possible to measure straight kicks integrated with sickle kicks, so that the development results are more effective and efficient.

Mustain & Akbar (2021) developed a test instrument, the reaction speed of kicks and punches, the results developed were obtained by 90.6% material experts, 91.4% media experts, 93.7% physical experts who could be said that these results were in the possible category. Trials to assess the test instruments used using thirty students. The instrument used uses a *whole-body reaction-based* tool. A critical review in this finding is that the feasibility of the tool used in the use of trials is not calibrated so that this finding is very doubtful. In addition, there are other doubts, for example how to decide and categorize samples in the trial stage. The development conducted by Hidayat & Haryanto (2020) with a kick agility test instrument found a reliable level of 0.96 which can be said that this test is dependable and possible for widespread use. This development is also conducted to categorize trials, both small trials and trials in large groups. The sample used was PPLP athletes from Gorontalo city consisting of fifteen athletes in small group trials, and thirty athletes in large group trials. Unfortunately, from these results athletes are only limited to the PPLP group, not

conducted randomly with various elements of athletes so that this also affects the realization in the use of kick agility test instruments. Another instrument development conducted by Sahri (2020) with the development of agility test instruments is known that it obtained high validity with 0.998 for large groups of men and 0.999 for large groups of women. With these results, it can be concluded that the agility test instrument can be used as a measuring tool to evaluate athletes' performance in terms of agility. From these results, it can also be criticized that the assessment and results of the test instruments produced have not met the specifications of martial arts athletes, because the agility needed must be narrowed to the needs during the competition.

CONCLUSION

The development of the pencak silat test instrument is a marker to measure the extent of the impact of exercise. So, with instruments as material to evaluate the performance of martial arts athletes. The results of the literature review had several elements of the pencak silat test instrument, which can be interpreted that the development is still conducted in isolation. So that in its interpretation there will be bias, even though the results have been declared valid and dependable from the articles that have been studied. The hope is that the instruments developed must be integrated with each other by combining several elements of the test element, so that their use will look more effective and efficient. In addition, the selection of samples used is only limited to certain circles, this is what results from development cannot be done in generalization, considering the characteristics of each different sample. Therefore, the suggestion from the results of this literature study is that instrument development can be conducted in an integrated manner and can be done holistically. So that in the future it can produce test instruments with standard standards.

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