Injury trends in Pencak Silat: Impact of regulation changes on sparring athletes

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ABSTRACT

Background: Pencak Silat is a martial arts sport with high physical contact intensity, resulting in a high risk of injury. To improve safety and sportsmanship, PERSILAT changed the competition rules in 2017. However, the impact of these changes on athlete injury rates is still debated.

Objectives: This study aimed to compare injury rates between the old and new rules in the sparring category of Pencak Silat athletes.

Methods: The study involved 40 sparring category Pencak Silat athletes in the Greater Malang area, aged 16-25 years, who had experience competing before and after implementing the new rules. Sampling used a purposive sampling technique. Data were collected through an online questionnaire and analyzed descriptively quantitatively with percentage calculations.

Results: The results showed a decrease in injury rates in the new rules compared to the old rules. 50.00% of respondents were injured 1-2 times under the new regulation, lower than 57.50% under the old regulation. The most common injury was bruising (27.06% under the new rules vs. 36.36% under the old rules), while dislocation injuries increased (18.82% vs. 15.58%). The most common injury was to the ankle. Most athletes stated that injuries affected their performance and daily activities.

Conclusions: Rule changes have not eliminated the risk of injury in high-contact sports such as Pencak Silat. A decrease in bruising followed by increased dislocations suggests the need for more specific prevention strategies. This study contributes to understanding the impact of new regulations on athlete safety.

Keywords: bruising, injury, injury rate, Pencak Silat, risk of injury.

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INTRODUCTION

Indonesia is a country that has a wealth of crops, diverse flora and fauna, and an abundant cultural heritage (Gristyutawati, 2012). As an integral part of Indonesian culture, Pencak Silat has been growing and developing for centuries (Ediyono & Widodo, 2019). As a form of martial arts, Pencak Silat has adapted to various situations and conditions of the surrounding nature (Aziz et al., 2023; Setiawan et al., 2023). Its presence has covered a period from prehistoric times to after independence. Pencak Silat, a traditional Indonesian martial art, has grown rapidly in recent decades (Li & Shapie, 2023; Muhyi & Purbojati, 2014). The increasing number of fighters at home and abroad evidences this. This popularity has also encouraged the development of Pencak Silat competition regulations to improve the safety and sportsmanship of athletes (Susanto et al., 2020). In 2017, the International Pencak Silat Association (PERSILAT) issued new regulations for Pencak Silat matches. The new regulations brought significant changes, including the scoring system and the allowed striking techniques.

Universities play a significant role in training athletes on the new regulations in Pencak Silat matches, demonstrating institutional support and commitment to the sport (Saleh et al., 2024). The regulations are designed to enable athletes to execute attack or defense techniques according to predetermined provisions. A lack of comprehension of these regulations can lead to difficulties in scoring or even losing matches (Hisbunnahar & Kurniawan, 2022). Given the complexity of the new competition system, fighters must be physically and mentally prepared (Vai & Ramadi, 2018). The new regulations in the Pencak Silat match provide clear guidelines for referees, judges, coaches, and most importantly, athletes (IPSI, 2023).

This rule change sparked debate among fighters and coaches. Some argue that the new regulations can improve athlete safety by reducing the risk of injury (Rahayuni et al., 2023). On the other hand, others were concerned that the new regulations could limit the techniques and strategies used in matches, hindering the development of Pencak Silat. One of the main issues associated with the new regulations is the injury rate of athletes. Some early research suggests that the new regulations may increase the risk of head and neck injuries in athletes, a potential cause for concern (Kusuma et al., 2023). Pencak Silat, a sport that emphasizes agility, flexibility, and speed in its movements, often causes injuries to athletes during training and matches. Injury is a common problem in individuals after physical activity or sports participation. Injury events can occur suddenly and are difficult to avoid, especially in the context of training and competition (Rahman & Warthadi, 2023).

On the other hand, some studies suggest that the new regulations could bring about positive changes. For instance, some studies have shown that the new regulations can reduce the risk of serious injury to athletes (Prakoso & Rochmania, 2018). This is because the new regulations prohibit high-risk striking techniques, such as blows to the head and neck (Rahayuni et al., 2023). This study aimed to analyze the level of injury in the sparring category Pencak Silat athletes using the new and old regulations and to analyze the level of injury using both existing regulations.

Persatuan Pencak Silat Indonesia (PPSI) is the official parent organization of Pencak Silat, recognized by KONI (Indonesian National Sports Committee) and other international organizations (Susiana & Wahyudi, 2023). In managing achievement improvement and championship management, it is important to adopt a specialized digital platform in the current 4.0 era (Nugroho, 2020). This step aims

to facilitate Pencak Silat practitioners' access to information and significantly increase professionalism in match management. The study also includes comparing the injury rate between the new and old regulations in the sparring category Pencak Silat athletes and identifying factors associated with the injury rate in these athletes. The results of this study are expected to provide significant benefits, both for the Management of the International Pencak Silat Association (PERSILAT) in improving competition regulations, useful for Pencak Silat coaches as a guide in developing safe and effective training programs, for Pencak Silat athletes in increasing understanding of the risk of injury and how to prevent it, as well as for medical personnel in providing optimal health services to Pencak Silat athletes. According to research conducted by Aasa et al. (2017), referenced by Keogh, weightlifting injuries have a distribution of 60% acute and 40% chronic, with 20% classified as severe injuries requiring rest for more than a week. The impact of these injuries forces athletes to rest from training and competition for an average duration of 11.5 days (Baihaqi et al., 2021).

This study is one of the first to specifically analyze the comparison of injury rates between the new and old regulations in sparring category Pencak Silat athletes. By using a methodology and data analysis that has been adjusted, the results of this study can provide accurate and reliable results. The impact is expected to significantly contribute to science and technology in the sport of Pencak Silat, which can improve the safety of Pencak Silat athletes and develop a safer and more sportive sport of Pencak Silat.

METHODS

Study Design and Participants

This research used a thorough quantitative descriptive method and a cross-sectional study approach. The research instrument, a comprehensive questionnaire, was designed to collect data related to factors identified in sports injury prevention theory, including:

1. External factors: Permitted technique changes, such as the introduction of new serve techniques in tennis, scoring systems like the point system in boxing, and the use of protective equipment.
2. Internal factors: Athlete's injury history, physical fitness, and recovery duration.

The population of this study, which includes sparring category Pencak Silat athletes in the Greater Malang area, is crucial for the success of this research. This area encompasses Malang City, Malang Regency, Batu City, and one of the universities, Universitas Negeri Malang. Samples were selected using purposive sampling techniques with the criteria of sparring category Pencak Silat athletes aged 16-25 years and athletes who have competed before and after the rule change.

Ethical approval statement

Ethical clearance of the study was sought from the Universitas Negeri Malang, Indonesia with the Number: 17.10.7/UN32.14/PB/2024.

Research Instruments

A 25-item questionnaire was used. Questions 1-5 related to athlete identity, anthropometric profile, and competition and training experience. Questions 6-10

referred to knowledge of the old regulations and the history of injuries sustained when competing under the old regulations. Questions 11-15 referred to the knowledge of the new regulations and the history of injuries experienced when competing with the new regulations. Questions 16-21 relate to the frequency of injury experienced, the impact of injury on performance, and the duration of recovery during injury. Questions 22-25 were related to injury management, injury recovery strategies, and approval of new and old regulations.

Data Analysis

Excel, a robust tool for statistical analysis, was the platform of choice for this study. The results, presented as numbers and percentages, were derived rigorously. The research groups were divided based on three criteria: 1. injury history, 2. type of injury as per the applied regulations, and 3. factors of injury occurrence as per the applied regulations. The answers from the subgroups were compared, and the study's technical rigor was further reinforced by using Cramer's V and Chi-Square Tests to determine the relationship between injury rates and rule changes.

RESULTS

Table 1 data underscores the need for a holistic approach to injury management. A significant majority of respondents (67.50%) reported that their injuries hindered their daily activities, highlighting the multifaceted impact of injuries on the lives of pencak silat athletes. This suggests that injury management strategies should not only focus on competitive performance but also consider athletes' daily lives. Conversely, a substantial proportion of respondents (32.50%) did not feel their injuries hindered their activities.

Table 1. Percentage Analysis Based on Injury History

Question	Answer	Number of Answer (N)	Percentage
Has your injury hindered your daily activities?	No	13	32,5%
	Yes	27	67,5%
	Total	**40**	**100%**
How often have you been injured, at the site of your previous injury?	Never Occurred	6	15%
	Ever Occured	24	60%
	Occured Repeatedly	10	25%
	Total	**40**	**100%**
After your injury, did you experience any difficulties in getting back into competition?	No Difficulties	18	45%
	Experiencing Difficulties	22	55%
	Total	**40**	**100%**
Has your injury affected your previous performance?	No Influence	10	25%
	Influence	30	75%
	Total	**40**	**100%**

60% of respondents injured the same area as they had previously, while another (25%) repeatedly injured it. This shows that injuries to specific areas (e.g., joints or muscles) can occur repeatedly due to technical factors in competition or lack of proper rehabilitation after the first injury. Only 15% of respondents had never had an injury in the same place, which suggests that although injuries are common, some athletes can avoid re-injury in the same area.

55% of respondents experienced difficulty returning to competition after an injury. This indicates that injuries impact athletes' physical and psychological aspects, and they may often feel worried or unsure of their physical abilities after an injury. Some athletes may experience tension, fear of re-injury, or lack of confidence. The remaining (45%) respondents did not feel any difficulties, which suggests they may have better experience or support in the recovery process, both physically and mentally.

Most respondents (75%) felt that their injuries affected their performance. Injuries can reduce an athlete's physical and mental capacity, leading to reduced performance during competition. This may be due to pain, movement limitations, or psychological trauma from previous injuries. The 25% of respondents who felt their injury did not affect their performance suggests that some athletes may be able to recover and return to their best after an injury fully.

Table 2. Percentage Analysis by Injury History of Old and New Regulations

Question	Answer	Old Regulations		New Regulations	
		Number of Answer (N)	Percentage	Number of Answer (N)	Percentage
How much have you been injured during a match?	Never	3	7,50%	4	10%
	1-2 times	23	57,50%	20	50%
	3-4 times	10	25,00%	9	22,5%
	5-6 times	0	0,00%	5	12,5%
	> 7 times	4	10,00%	2	5%
	Total	**40**	**100%**	**40**	**100%**
Which part of your body has been injured during a match? (can choose more than one)	Head	4	5,33%	3	3,7%
	Shoulders	8	10,67%	14	17,28%
	Arms	9	12,00%	9	11,11%
	Wrist	12	16,00%	12	14,81%
	Chest and Abdomen	2	2,67%	2	2,47%
	Waistband	3	4,00%	6	7,41%
	Knees	12	16,00%	13	16,05%
	Ankle	25	33,33%	22	27,16%
	Total	**75**	**100,00%**	**81**	**100%**
What types of injuries have you experienced during a match? (can choose more than one)	Muscle cramps	17	22,08%	17	20%
	Contusion/bruise	28	36,36%	23	27,06%
	Excorations/scuffs	5	6,49%	5	5,88%
	Lacerations/tears	3	3,90%	1	1,18%
	Sprain	5	6,49%	10	11,76%
	Strain	4	5,19%	7	8,24%
	Fracture	1	1,30%	2	2,35%
	Dislocation	12	15,58%	16	18,82%
	Concussion	2	2,60%	4	4,71%
	Total	**77**	**100,00%**	**85**	**100%**

Referring to Table 2, 57.5% respondents experienced 1-2 injuries when using the old regulations, while when using the new regulations, injuries that occurred 1-2 times decreased with the results 50%—for injuries that occurred 3-4 times in the old regulations as much as 25% also decreased in the new regulations to 22.5%. However, those who never experienced an injury also experienced an increase with a result of 10%, compared to the old rule, which only had a result of 7.5%. The rule changes reduce the likelihood of athletes sustaining injuries with a high frequency.

The most common injuries were bruises, muscle cramps, and dislocations. Bruises decreased during the use of the new regulations from 36.36% to 27.06%. Muscle cramps showed relatively stable results between the two regulations. However, dislocation increased from 15.58% to 18.82%.

The reduction in ankle injuries 33.33% to 27.16% likely stems from the new rules limiting low kicks, a direct application of injury prevention theory through technique modification. Conversely, the increased shoulder injuries 10.67% to 17.28% suggest that defensive maneuvers under the new regulations place greater demand on upper-body stability. These findings highlight the need for sport-specific conditioning programs that strengthen vulnerable regions while adapting to rule changes.

Table 3. Percentage Analysis by Injury Type of Old and New Regulations

Question	Answer	Old Regulations		New Regulations	
		Number of Answer (N)	Percentage	Number of Answer (N)	Percentage
Which anatomical structure of the body has been injured during a match?	Bones	11	17,74%	10	16,95%
	Joints	31	50,00%	23	38,98%
	Muscles	14	22,58%	18	30,51%
	Nerve	0	0,00%	1	1,69%
	Skin	6	9,68%	7	11,86%
	Total	**62**	**100,00%**	**59**	**100,00%**

Referring to Table 3, injuries to joints and muscles were the most common in both regulations. In the old regulation, injuries to joints were recorded as much as 50%, while in the new regulation, there was a decrease, resulting in a result of 38.98%. In contrast to muscle injuries, the old regulation had a percentage result of 22.58% but increased in the new regulation to 30.51%. This may be due to a variety of factors such as the wrong technique, lack of warm-up when competing, overtraining, lack of muscle strength and flexibility, and so on. Understanding these potential causes is crucial for injury prevention.

Table 4. Percentage Analysis Based on Injury Occurrence Factors of Old and New Regulations

Question	Answer	Old Regulations		New Regulations	
		Number of Answer (N)	Percentage	Number of Answer (N)	Number of Answer (N)
Do you understand the regulations of pencak silat in the sparring category?	Yes	40	100%	39	97,5%
	No	0	0%	1	2,5%
	Total	**40**	**100%**	**40**	**100%**

Referring to Table 4, all respondents claimed to understand the old regulations, which shows they are very familiar with the sparring category pencak silat athletes, who may have practiced them widely for a long time. However, even so, the new regulations have also been widely understood by respondents, with a percentage result of 97.50%; this shows that the socialization or training process related to the new regulations has so far been quite effective, although there are still a few who may not master or understand the technicalities of this new rule.

The time taken by respondents after an injury varied (Table 5). A total of 17.5% only needed less than one week of rest, while 25% needed 1 week, and the same number needed 2 weeks to recover. There were also 12.5% who needed up to 1 month of rest, while the remaining 20% needed more than 1 month to recover. These

findings are significant as they show that the severity of injuries sustained by respondents varied, with most taking 1 to 2 weeks to recover.

Table 5. Percentage Analysis Based on Injury Management

Question	Answer	Number of Answer (N)	Number of Answer (N)
How long do you need to rest after an injury?	<1 week	7	17,5%
	1 week	10	25%
	2 weeks	10	25%
	4 weeks	5	12,5%
	Over 4 weeks	8	20%
	Total	**40**	**100%**
To what extent have you reduced the intensity of your training and matches due to your injury?	Not Reducing	15	37,5%
	Reduce	21	52,5%
	Never Training and Competing Again	4	10%
	Total	**40**	**100%**
How have you treated your injuries?	Taking care of injuries personally	17	42,50%
	Cared for/under the supervision of a trainer	5	12,50%
	Treated by medical personnel/physiotherapist	11	27,50%
	Cared for by traditional personnel (massage)	7	17,50%
	Total	**40**	**100%**

In dealing with injuries, respondents have different habits in managing training intensity and participation in matches. A total of 37.5% did not reduce the intensity of training and continued to participate in matches despite the injury. Meanwhile, most respondents 52.5% chose to reduce the training intensity and competition frequency. Another 10% even decided to never train and compete again after suffering an injury.

Regarding injury management, most respondents chose to treat the injury independently, as many as 42.5%. Only 12.5% received treatment directly under the supervision of a coach. Meanwhile, 27.5% chose to be treated by medical personnel or physiotherapists, which shows awareness of the importance of more professional medical care. In addition, 17.5% chose traditional methods, such as massage, to treat their injuries.

Furthermore, to determine whether there is a relationship between the occurrence of injuries due to rule changes, the Chi-Square and Cramer's V tests were conducted to determine how strong the relationship is. Table 6 presents the results of the Chi-Square test.

Table 6. Relationship of Injury Incidence between Old and New Regulations

Types of Injuries	Old Regulations (N)	New Regulations (N)	Chi-Square (X^2)	p	Cramer's V
Contusion	28	23	3.09	0.377	0.172
Dislocation	12	16			
Strain	4	7			
Sprain	5	10			

Our analysis, as shown in Table 6, reveals a crucial finding: the p-value of 0.05 indicates no significant relationship between rule changes and the types of injuries experienced by athletes in Pencak Silat matches. This finding, supported by a Cramer's V value of 0.172, underscores the weak relationship between rule changes and injury types. Importantly, our research suggests that injuries in Pencak Silat matches are more likely influenced by a complex interplay of factors, including competition techniques, athletes' physical condition, or protective equipment, rather than rule changes.

DISCUSSION

The results showed that while the new regulations reduced contusion injuries, the increase in dislocation injuries indicates that rule changes alone cannot mitigate all injury risks. This finding aligns with sports injury prevention theory, which states that a multifactorial approach (e.g., technique training, muscle strengthening, and rule enforcement) is required for maximum effectiveness. The low Cramer's V value (0.172) reinforces the argument that factors beyond regulation (such as athletes' physical readiness) play a crucial role. Therefore, recommendations for Pencak Silat coaches and organizations include regulatory adjustments and training programs focusing on injury prevention.

The findings of this study show that rule changes in Pencak Silat impact the type and frequency of injuries experienced by athletes. While some injury types, such as bruises and joint injuries, decreased, there was an increase in muscle injuries and dislocations. This suggests that while the new regulations are designed to improve safety, injury risks still need attention.

These findings align with a study involving 186 Pencak Silat athletes who participated in the 2018 XIX Silver Games. In their study, Abdul Latif et al. (2022) explained that bruising was the most common injury, the leading cause being kicks. Meanwhile, Kusuma and Novita (2023) reported that the incidence of injury in male athletes was higher than that of female athletes. Bruising was also the most common injury at 32.9/1000 hours (36.7%). Another study reported that head injuries were 9.26%, body injuries were 4.63%, hand injuries were 46.3%, and leg injuries were 39.81%. This data also highlights the physical impact on the athletes, with hand injuries being the most common among sparring category youth Pencak Silat athletes from Special Sports Classes in Central Java Province, followed by leg injuries, head injuries, and the least common body injuries (Purnomo, Hidayat, & Santoso, 2024).

The leading causes of injuries in Pencak Silat are diverse, involving intrinsic and extrinsic factors. These injuries are prevalent due to the nature of the sport, which includes high-intensity physical interactions such as strikes, kicks, and wrestling. Athletes, coaches, and sports enthusiasts must understand these risks and take proactive measures for injury prevention. The most common injuries are to the hands and feet, with hand injuries being the most common among youth athletes in Central Java (Purnomo, Hidayat, & Santoso, 2024). These injury mechanisms often involve direct contact, such as an opponent's kick and offensive maneuvers (Kusuma & Novita, 2023). Age, gender, body mass index, history of previous injury, and joint laxity are intrinsic factors in the occurrence of injury, and duration, frequency of training, and sparring can affect injury risk (Dzakiya, Tinduh, & Utomo, 2021).

The findings in this study are new because no study has investigated changes in regulations on the occurrence of injuries, so these findings can be used as evaluation

material for coaches and Pencak Silat organizations in developing more effective injury prevention strategies. By knowing the types of injuries that are more dominant in the new regulations, coaches can adjust training methods to strengthen areas of the body that are prone to injury. In addition, Pencak Silat organizations can consider revising rules regarding protection or safer defensive techniques.

Future research is recommended to use direct observation methods or medical records to gain a more in-depth understanding of the impact of the regulatory changes on athlete injuries. These methods are crucial in reducing injury reporting bias, thereby enhancing the reliability of future research findings. In addition, future studies could compare injury patterns across different levels of competition to see if the new regulations have a different impact at the novice and professional levels.

The alarming rise in muscle injuries (22.58% to 30.51%, Table 3) underscores the pressing need for adequate neuromuscular adaptation to the new techniques, a gap identified in sports injury prevention theory. This theory posits that athletes require 8–12 weeks to adapt biomechanically to rule changes; the data suggest that current training regimens may fall short. Practical implications include:

1. For coaches: Integrating proprioceptive and eccentric strength training can significantly reduce muscle strains, leading to a more robust and injury-resistant team.
2. For policymakers, the importance of phased rule changes cannot be overstated. Introducing significant changes alongside preseason training modules can ensure athletes have the necessary time for physiological adaptation, thereby reducing the risk of injuries.

Limitations of the study

While these findings provide valuable insight into the impact of regulatory changes on injury rates, it is important to note some limitations. One of these is that the data collection method relied on athlete self-report, which could lead to bias in injury recall. This highlights the need to consider potential biases in future research. In addition, this study was conducted in only one region, so it may not represent the overall population of Pencak Silat athletes, emphasizing the importance of considering regional variations in future studies.

CONCLUSIONS

The study showed that while the new regulations in Pencak Silat decreased the incidence of some injury types, such as bruises and joint injuries, other injury types, such as dislocations and muscle injuries, increased. This suggests that the rule changes did not necessarily eliminate the risk of injury but shifted the types of injuries.

The results of the analysis showed that rule changes in Pencak Silat did not have a significant influence on the types of injuries experienced by athletes. Although there was a slight difference in the distribution of injuries, the relationship between these two variables was very weak, so other factors, such as competition technique, athletes' physical condition, and environmental factors, may play a more significant role in determining the level of injury risk.

While the new regulations have successfully reduced some direct impact risks, it is clear that challenges remain in improving overall athlete safety. This underscores the need for further research to identify other factors influencing injury rates. This is a call to action for all stakeholders, including coaches, athletes, the PERSILAT

organization, and sports medical personnel, to collaborate and contribute to the ongoing improvement of safety in Pencak Silat.

The results of this study are expected to serve as a reference for coaches, athletes, the PERSILAT organization, and sports medical personnel. Your expertise and dedication are crucial in developing more effective injury prevention strategies. Future studies should combine medical records with biomechanical analysis to validate self-reported data, further enhancing our collective efforts to ensure the safety of Pencak Silat athletes.

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DATA AVAILABILITY

The data that support the findings of this study are available on request from the corresponding author, JAS. The data are not publicly available due to their containing information that could compromise the privacy of research participants.

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CONFLICT OF INTEREST

The author officially certifies that there are no conflicts of interest with any party with respect to this research.

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