Journal Of Sport Education (JOPE)
Available online on http://jope.ejournal.unri.ac.id/php.index/jope
Volume 7, Number 1, 2024: 39-48
DOI:http://dx.doi.org/10.31258/jope.7.1.39-48

IDENTIFIKASI DAN TINDAKAN PENANGANAN CEDERA ATLET ELIT PENCAK SILAT: SEBUAH STUDI PADA KEJUARAAN BABAK KUALIFIKASI PON XXI TAHUN 2023

IDENTIFICATION AND TREATMENT OF ELITE PENCAK SILAT ATHLETE INJURY: A STUDY OF THE QUALIFICATION ROUND OF THE PON XXI IN 2023

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Received: 2024-03-12; Revised: 2024-10-30; Accepted: 2024-10-30

Abstrak

Studi ini merupakan sesuatu hal yang penting dilakukan untuk mengetahui gambaran mengenai cedera yang dialami atlet pencak silat kategori tanding pada tataran elit serta bagaimana solusinya untuk menangani cedera. Metode yang digunakan adalah adalah metode deskriptif dengan studi dokumentasi. Teknik pengambilan data adalah dengan menggunakan data sekunder yaitu data dokumentasi atlet pencak silat yang mengalami cedera yang didapatkan dari tim medis. Berdasarkan pertandingan pencak silat pada kejuaraan elit Pra-Pon Solo yang dilaksanakan pada tanggal 11 - 13 September 2023 dan melibatkan pesilat sebanyak 681 orang, hanya ditemukan 12 atlet berjenis kelamin laki-laki yang mengalami cedera dan semuanya adalah kategori tanding. Studi ini memberikan temuan umum bahwa cedera yang sering terjadi dalam pertandingan pencak silat di tataran elit adalah cedera anggota tubuh bagian atas (7 kasus cedera). Sedangkan anggota tubuh bagian bawah hanya ditemukan lebih sedikit kejadian cedera (4 kasus cedera), 1 kasus cedera patah tulang tidak diketahui lokasinya. Terkait penanganan cedera, perbedaan jenis cedera yang terjadi juga memiliki penanganan lanjutan yang berbeda pula. Berdasarkan temuan yang ada, cedera pada area kepala dan cedera dengan diagnose patah tulang maupun dislokasi, beberapa kasus dilakukan penanganan tambahan dengan mengirim atlet ke rumah sakit untuk tindakan lebih lanjut, sedangkan beberapa yang lain terlebih dahulu diberikan *treatment* obat. Berdasarkan temuan tersebut dapat diberikan kesimpulan bahwa cedera pada atlet pencak silat dapat terjadi pada tubuh bagian atas maupun tubuh bagian bawah dengan tingkat cedera ringan hingga berat yang ditandai tindakan lanjutan terhadap cedera yang dialami atlet pencak silat.

Kata kunci: kategori tanding, olahraga tarung, kategori tanding, cedera

Abstract

This study is important to find out the picture of injuries experienced by elite category pencak silat athletes and how to solve the injuries. The method used is a descriptive method with documentation study. The data collection technique uses secondary data, namely documentation data of pencak silat athletes who have injuries obtained from the medical team. Based on the pencak silat match at the Pra-Pon Solo elite championship held on September 11-13, 2023, and involving 681 athletes, only 12 male athletes were found to have injuries and all of them were in the competing category. This study provides general findings that the injuries that often occur in elite-level pencak silat matches are upper limb injuries (7 cases of injury). While the lower limbs were only found to have fewer injuries (4 cases of injury), and 1 case of fracture injury of unknown location. Regarding injury management, the different types of injuries that occur also have different follow-up treatments. Based on the findings, injuries to the head area, and injuries diagnosed with fractures or dislocations, some cases were treated additionally by sending athletes to the hospital for further action. In contrast, some others were first given drug treatment. Based on these findings, it can be

ISSN 2654-4474 (Print), ISSN 2654-9069 (Online)

concluded that injuries to pencak silat athletes can occur in the upper body or lower body with mild to severe levels of injury marked by further action on injuries experienced by pencak silat athletes.
Keywords: *fighting category, combat sport, fighting category, injury.*

How To Cite: Syaifullah, R., Nugroho, H., Saputro, D.P. (2024). Identification and treatment of elite pencak silat athlete injury: A study of the qualification round of the pon xxi in 2023. *Journal Of Sports Education (JOPE)*, 7 (1), 39-48. doi:http://dx.doi.org/10.31258/jope.7.1.39-48

INTRODUCTION

Martial arts are a popular sport all over the world (Tropin et al., 2023). Every year the level of professionalism and technical skills of athletes increases, so the competition becomes more intense and spectacular (Latyshev et al., 2022; Goloha & Bartik, 2023). The non-combat forms have a lower risk of injury and the sparring/combat elements have a greater potential for injury (Koutures & Demorest, 2018). Injuries in combat sports have become an important concern for previous researchers (Tulendiyeva et al., 2021; Koutures & Demorest, 2018; Zetaruk et al., 2005). A study by (Sobieraj et al., 2023) resulted in findings that combat sports players often experience bone fractures. Other findings state that the knee and ankle are the most common injury locations in martial arts (Laoruengthana et al., 2009). Several of these findings strengthen the statement by (Tok, 2011) that combat sports is a risky sport. Thus, dangerous life-threatening techniques are no longer learned from the practice routine (Tulendiyeva et al., 2021).

Considering several previous findings, the study of injuries in combat sports is something important to study further. This is because injuries experienced by athletes can disrupt an athlete's performance (Melin et al., 2024) and of course can damage the athlete's chances of successful performance (Drew et al., 2017; Kusuma et al., 2023). By knowing some of the negative effects of injuries experienced by athletes when competing, this will have the potential to stimulate the emergence of new innovations in order to minimize the occurrence of injuries, for example through new regulations in competitions to limit several rules in providing safety to reduce injuries (Tulendiyeva et al., 2021).

This also applies to pencak silat through restrictions on the use of techniques that have recently been implemented in pencak silat through the IPSI 2022 regulations, for example limiting one of the sweeping and cutting techniques for early ages (Umaryono et al., 2023). This is normal considering that pencak silat is one of the sports with the highest risk of injury (Laoruengthana et al., 2009). A work states that the lower limbs of pencak silat athletes are the area's most frequently injured with the severity of injuries in men being 3 times higher than in women (Kusuma & Novita, 2023). Other findings also explain that male adult athletes over 25 years of age who are obese, sagging, and have flat feet have a higher risk of experiencing an ACL injury (Dzakiya et al., 2021). There are also studies that say bruises are the most common injury and kick attacks are the common cause (Latif et al., 2022). Of the many studies on injuries in pencak silat, none has studied injuries that occur in elite athletes accompanied by further treatment by the medical team.

Considering that the risks that can arise are very high, currently various efforts have been made, for example through counseling and training activities that provide Sports Injury Counseling Interventions for Pencak Silat Athletes (Almadani et al., 2022). Another attempt has also been made, for example, through training in handling sports injuries through sports massage and the RICE method (Hidayatullah & Saputra, 2021). Not only that, Biomechanical Based Android Application Design system which is also important in preventing injuries and improving athlete performance (Riyadi et al., 2023).

Although several researchers have studied injuries in pencak silat, the study of injuries in

ISSN 2654-4474 (Print), ISSN 2654-9069 (Online)

pencak silat is still a very limited study at this time. Thus, to increase the distribution of injury findings in pencak silat, in this study we aim to find out the description of the level of injury to elite athletes at the 2023 national championship events leading up to PON 2024 and the follow-up treatment by the medical team. The urgency of this research is that by knowing the mapping of the injury levels of elite athletes and their treatment, we will obtain descriptions of the injuries experienced by pencak silat athletes in the competitive category at the elite level and what the solutions are for dealing with injuries. This is also in line with what was stated by (Latif et al., 2022) that understanding most of the risk factors is believed to help develop preventive measures for athlete safety.

Apart from that, the results of this research will also have the potential to be useful in providing recommendations to policy makers in order to provide regulations that can reduce the level of athlete injuries. Apart from that, it also has the potential to have benefits for coaches to anticipate several possible occurrences of the same injury by providing anticipatory exercises. By identifying injuries, more effective prevention strategies can later be developed to reduce the risk of injury (Muhibbi et al., 2023). Of course, this will be a long study and requires further research at other silat championships, for example at the elite level, to obtain data on mapping athlete injury rates, especially with the emergence of new rules. This is because the new regulations for pencak silat competitions affect the physical and technical requirements that are more dominant for the silat fighters (Wibowo & Za, 2023).

METHOD

The type of study used in this research is a documentation study. Documentary studies are records of events in the past. These notes can be in the form of writing, pictures, or some important work from someone (Sugiyono, 2019). The population in this study was the total number of participants in the National Pencak Silat Championship, PON XXI Qualification Round for the Pencak Silat sport, 681 people consisting of 409 men and 272 women competing in 22 competition numbers consisting of 16 *tanding* categories and 6 *jurus seni* categories. The sampling technique used was purposive sampling, namely athletes who experienced injuries. Of the many athletes who participated, it was found that only 12 male athletes were injured and all of them were in the competition category. Considering that this type of research is a documentation study, the data we get in this research is secondary data which is a report from the medical team at the 2023 national championship. We are part of the team tasked with Monitoring and Evaluation of the qualification round of the PON XXI in 2023. These results need to be published so that they can be accessed by all parties to find out what injuries occurred in the new rules and how to handle them. These results are also used as one of the inputs for the new policy in the pencak silat category match which is currently a pro and con in society The data about athlete injuries can only be obtained in full from reports provided by the medical team who have been assigned.

In this study, researchers will later display the athlete's initials, origin of the contingent (initial), complaints, and follow-up actions taken by the medical team for each athlete who suffered an injury (see table 1).

RESULTS

Table 1. Types of athlete injuries and treatment measures

Athletes	Team	Complaints/Diagnosis	Treatment measures
AS	A	• Diagnosis: Ligament injury with suspected grade 2-3 tear	• Refer to UNS Hospital for X-ray photo
RB	B	• Complaints: Left shoulder pain • Complaints: Suspect left scapula dislocation	1. Medication: Mefenamic acid 2. Refer to UNS Hospital for

ISSN 2654-4474 (Print), ISSN 2654-9069 (Online)

Athletes	Team	Complaints/Diagnosis	Treatment measures
			X-ray photo
RN	C	1. Complaints: Swelling in 3-4 fingers on the left 2. Diagnosis: Suspect dislocation	• Refer to UNS Hospital for X-ray photo
MP	D	1. Complaints: Due to a collision during the match 2. Diagnosis: Slight head trauma	• Refer to UNS Hospital
MU	E	• Diagnosis: Sub conjunctival bleeding	• Refer to UNS Hospital
WS	F	• Diagnosis: Suspect nasal fracture	1. Refer to UNS Hospital for X-ray photo 2. Medicine: Tranexamic acid, ketorolac, glucosamine
MY	G	• Diagnosis: Shoulder dislocation	1. Refer to UNS Hospital for X-ray photo 2. Medication Treatment: Ketorolac, eperison, mecobalamin,
AP	H	• Complaints: Left leg pain	• Refer to UNS Hospital
TA	I	• Complaints: Head injury	• Refer to UNS Hospital
IM	J	• Diagnosis: Suspect fracture of left 3-4 digits	• Refer to UNS Hospital for X-ray photo
FL	K	• Complaints: The right eye is red, painful, there is a slight tear, there is irritation when competing	• Refer to UNS Hospital
MI	L	• Diagnosis: Suspect fracture	1. Refer to UNS Hospital for X-ray photo 2. Medication Treatment: diclofenac sodium, eperison.

Table 1 provides an explanation of the complaints/diagnosis of injuries experienced by each athlete. In table 1, information is also obtained about the follow-up actions taken by the medical team for pencak silat athletes in the competition category who experienced injuries. Based on this table, several other information can also be provided, for example the total number of athletes who suffered injuries was 12 pencak silat athletes who came from several regions in Indonesia. In each region, 1 athlete suffered an injury and received treatment from the medical team.

Based on table 1, some information can also be obtained that the most injured area is the head area with a total of 5 injury cases. The remaining shoulder area was 2 cases, fingers 2 cases, ligaments 1 case, and feet (not specifically stated the location of the injury) 1 case.

DISCUSSION

The main findings from this limited research are generally divided into two parts. First,

ISSN 2654-4474 (Print), ISSN 2654-9069 (Online)

pencak silat athletes in the sparring category often experience injuries to the upper body. Second, the lower part is the part where fewer cases of injury are found. Different types of injuries that occur also have different follow-up treatments. Based on the existing findings, injuries to the head area (most injuries) and injuries diagnosed with fractures or dislocations received additional treatment by sending the athlete to the hospital for further action. Additional treatment needs to be carried out in the hospital considering that further treatment or referral requires equipment that is only provided in the hospital. For example, x-rays of the head, thorax, or x-rays of bone areas that cannot be seen directly by the medical team's eyes. In addition, this equipment is only available in hospitals and it is not possible to provide a medical team on the field during pencak silat matches.

We state that the general findings in this study are in contrast to previous findings which stated that the lower limbs were the area's most frequently damaged (Kusuma & Novita, 2023). Apart from that, the findings in this study also contradict previous findings that the highest risk of injury occurs in pencak silat involving the upper extremities, head and neck, and axial body parts, respectively (Laoruengthana et al., 2009). However, the knee and ankle are the most common injury locations. This indicates that injuries experienced by pencak silat athletes can occur in all parts of the body. The prevalence of injuries for each athlete in a particular championship may be different. However, if put aside which injuries are the most common, these previous findings actually also state the same thing that injuries to the nose, broken bones and several injuries to other parts of the body can also occur in the fighting category of pencak silat sports.

Therefore, concluding which injuries most often occur in pencak silat sports is too early and certainly requires further research to obtain a wide distribution of data regarding injuries in pencak silat sports. It is currently unknown what causes the differences in the findings of the most common injuries. However, The new regulations for pencak silat competitions affect the physical and technical requirements more dominantly for the silat fighters (Wibowo & Za, 2023). So based on our analysis, the new regulations are one of the strongest reasons. This is because in the new regulations, athletes are allowed to perform one technique, for example a pull, which can have an impact effect on the upper body.

If we refer to other findings in other martial arts sports, martial arts injuries other than pencak silat, the most common injury locations found in martial arts based on a literature review are the head, face and neck (Ferretti et al., 2024). This means in line with our findings that the most common injuries were to the upper body. In this documentation study we found 2 cases of head injury and no medication therapy was given. Athletes who experience head injuries are given further action in the form of sending the athlete to the hospital for further treatment. Head trauma and brain injuries in martial arts can result from direct blows to the head, rotation of the head due to impacts or falls on the body, and from choke mechanisms, such as those used in MMA (Koutures & Demorest, 2018). In this finding, we try to compare it with cases that occur in other martial arts that allow attacks on the head, for example MMA. This aims to determine the effects caused by injuries to the head even though in pencak silat sports it is prohibited to attack the head area. However, cases of head injuries are still found, as in our findings with two cases.

MMA fighting may be associated with repeated head injuries (Lockwood et al., 2018). The head is one of the parts that contributes to an athlete's readiness to take part in martial arts competitions. In the case of the professional MMA matches, 28% of fights end after head trauma results in the losing fighter becoming fully or partially unresponsive (Buse, 2006). Even though in the sport of pencak silat there is a prohibition against attacks on the head, it still has the potential to happen, and of course it will have bad effects for martial arts athletes. Precautions need to be implemented to ensure the safety of combat athletes and limit the risk of injury (Fares et al., 2021). Finally, based on these findings, other security measures may need to be

ISSN 2654-4474 (Print), ISSN 2654-9069 (Online)

added even though currently attacks to the head are not permitted. This is because injuries can occur due to the effects of falls made by martial artists.

Apart from upper head injuries, the most common injuries in our findings were injuries to the eye area. Injury to the eye is one type of injury that can occur in martial arts athletes in the fighting category, for example, cases of eye injuries in MMA which often accompany these fighters and they lose their matches (Fliotsos et al., 2021). In our study, two cases of eye injuries were found and all athletes with eye injuries were given a recommendation from the medical team for further treatment at the hospital. In our study findings, eye injury cases are one of the serious cases. It seems that eye injuries are a serious problem in combat sports, for example boxing. This can be seen from the findings which state that eye injuries in boxing are also serious (Karpman et al., 2016).

Head area injuries in our findings seem to dominate, for example nose injuries that fall within the head area. Nasal fractures and orbital fractures are the most common fracture locations for all combat sports (Hojjat et al., 2016). In our findings, the nose area is also one of the locations of injury experienced by pencak silat athletes. There was only 1 case of injury to the nasal area with a diagnosis of suspected nasal fracture. In our findings, athletes who had nasal fractures were given tranexamic acid drug therapy and recommended for further follow-up to the hospital. Tranexamic acid Tranexamic acid, a synthetic lysine analogue antifibrinolytic, was first patented in 1957 and its use has increased in contrast to aprotinin, a serine protease inhibitor antifibrinolytic (Ng et al., 2015). Tranexamic acid to reduce morbidity and mortality in surgical and traumatic bleeding (Hunt, 2015). Tranexamic acid should be added for the treatment of traumatic bleeding (Napolitano et al., 2013). Apart from that, in our findings there is also another treatment, namely the use of glucosamine which according to studies (Conrozier & Lohse, 2022) glucosamine has clinically relevant effects on pain.

The next injury that we find in the fighting category of pencak silat sports is shoulder injuries. The highest frequency of injuries in martial arts and combat sports in the upper extremities is the shoulders, hands and fingers, while in the lower extremities it is the feet and toes, ankles and knees (Del Vecchio et al., 2018). A finding in many martial arts sports also states that shoulder/upper arm injuries (27%) are the second most common injury experienced by martial arts athletes. Then followed by the forearm/elbow (19%). Meanwhile, the hand/wrist is the area most frequently injured (53%) (Diesselhorst et al., 2013). In our study, there were 2 cases of shoulder injuries, 2 cases of finger injuries, 1 case of ligament injury and 1 case of foot injury. The first is pain in the left shoulder with suspected dislocation of the left scapula. One of the drug treatments given is Mefenamic Acid because there is pain at the injury site. Second, the shoulder dislocation was treated with the drugs ketorolac, eperison, mecobalamin. The use of these drugs can be recommended as stated by several experts (White et al., 2012; Pinzon & Sanyasi, 2018; Zhang & Ning, 2008). In addition, the use of Mefenamic Acid remains relevant for pain syndromes and some gynecological disorders (Cimolai, 2013). Regarding reducing pain, an alternative finding stated that passion fruit juice was declared effective in reducing muscle pain due to bruises in pencak silat athletes with a significant reduction in muscle pain after consuming passion fruit juice (0.8 grams) twice a day for ten days (Irawan, 2017). Perhaps those findings could also be an alternative medical therapy to reduce the pain suffered by pencak silat athletes.

The weakness in this research is that we did not observe the process of injury in the field. Even though the process is not observed, this is still important considering that the data obtained is the result of data collection on injured athletes by the assigned medical team. However, in order for the findings to be more complete, other methods also need to be used, for example through observation so that the injury process that occurs can be observed by researchers to arrive at the actions taken by the medical team regarding injuries experienced by pencak silat athletes in the competition category. The question that currently remains is, is

ISSN 2654-4474 (Print), ISSN 2654-9069 (Online)

there a connection between the number of injury cases experienced by athletes and the new rules in the competitive category of pencak silat sports? This question can be answered through further research studies comparing the impact of old vs new rules on athlete injury rates. Other future research also needs to investigate injuries at the non-elite level considering that the physical readiness of non-elites may not be as good. In this way, there will also be a possibility of finding higher levels of injury at the level of non-elite athletes. This is needed as a form of effort to come up with recommendations/suggestions for competition rule policy makers to pay more attention to the level of safety of athletes competing. Apart from that, it is also a recommendation for coaches to anticipate all possible forms of injury in the future.

CONCLUSION

The main findings from this limited research are generally divided into two parts. First, pencak silat athletes in the sparring category often experience injuries to the upper body. Meanwhile the second, the lower part is the part where fewer cases of injury are found. Our findings do not have the main aim of concluding the most common injuries suffered by pencak silat athletes during competition. This is one of the initial findings to identify injuries that athletes get when competing, especially with the emergence of new regulations. Indeed, in our findings, it was found that the most common injuries experienced by athletes were injuries to the upper body with the most frequent locations being around the head. However, as we have previously said, other methods also need to be used, for example through observation so that the injury process that occurs can be observed by researchers until the action taken by the medical team is reached. Apart from that, the recommendations for future research as we have stated in the discussion seem worthy of being studied by researchers and seem to be interesting to discuss. The actions of the medical team regarding injuries experienced by athletes are also something important and it seems important to be studied by other researchers.

REFERENCES

Almadani, Z., Vitasari, L., Ziyan, A. N. A., & Sudaryanto, W. T. (2022). Intervensi Penyuluhan Cedera Olahraga Pada Atlet Pencak Silat Pagar Nusa Ranting Gonilan. In *Jurnal Pengabdian Masyarakat* (Vol. 1, Issue 2, pp. 120–126). Universitas 45 Surabaya. https://doi.org/10.30640/abdimas45.v1i2.274

Buse, G. J. (2006). No holds barred sport fighting: A 10 year review of mixed martial arts competition. *British Journal of Sports Medicine*, *40*(2), 169–172. https://doi.org/10.1136/bjsm.2005.021295

Cimolai, N. (2013). The potential and promise of mefenamic acid. *Expert Rev. Clin. Pharmacol.*, *6*(3), 289–305. https://doi.org/https://doi.org/10.1586/ecp.13.15

Conrozier, T., & Lohse, T. (2022). Glucosamine as a Treatment for Osteoarthritis: What If It's True? *Frontiers in Pharmacology*, *13*(March), 1–5. https://doi.org/10.3389/fphar.2022.820971

Del Vecchio, F. B., Farias, C. B., de Leon, R. C., Rocha, A. C. C. A., Galliano, L. M., & Coswig, V. S. (2018). Injuries in martial arts and combat sports: Prevalence, characteristics and mechanisms. *Science and Sports*, *33*(3), 158–163. https://doi.org/10.1016/j.scispo.2018.02.003

Diesselhorst, M. M., Rayan, G. M., Pasque, C. B., & Peyton Holder, R. (2013). Survey of upper extremity injuries among martial arts participants. *Hand Surgery : An International Journal Devoted to Hand and Upper Limb Surgery and Related Research : Journal of the Asia-Pacific*

ISSN 2654-4474 (Print), ISSN 2654-9069 (Online)

Federation of Societies for Surgery of the Hand, *18*(2), 151–157. https://doi.org/10.1142/S0218810413500172

Drew, M. K., Raysmith, B. P., & Charlton, P. C. (2017). Injuries impair the chance of successful performance by sportspeople: A systematic review. *British Journal of Sports Medicine*, *51*(16), 1209–1214. https://doi.org/10.1136/bjsports-2016-096731

Dzakiya, F. N. A., Tinduh, D., & Utomo, D. N. (2021). Risk Estimation of Anterior Cruciate Ligament (ACL) Injury in East Java Puslatda Pencak Silat Athletes. *Surabaya Physical Medicine and Rehabilitation Journal*, *3*(1), 29–38. https://doi.org/10.20473/spmrj.v3i1.23190

Fares, M. Y., Salhab, H. A., Fares, J., Khachfe, H. H., Fares, Y., Baydoun, H., Abboud, J. A., & Alaaeddine, N. (2021). Craniofacial and traumatic brain injuries in mixed martial arts. *Physician and Sportsmedicine*, *49*(4), 420–428. https://doi.org/10.1080/00913847.2020.1847623

Ferretti, F., Iocca, O., Gallesio, Cesare Quaglia, P., & Ramieri, G. (2024). Cranio-Maxillofacial Injuries in Mixed Martial Arts. *The Journal of Craniofacial Surgery*, *35*(2), 432–436. https://doi.org/10.1097/SCS.0000000000009930

Fliotsos, M. J., Reed, D. S., Giles, G., Altman, A. H. H., Santamaria, J. A., Zafar, S., Carlton, D. K., Johnson, A. J., Davies, B. W., Legault, G. L., Woreta, F. A., & Justin, G. A. (2021). Prevalence, patterns, and characteristics of eye injuries in professional mixed martial arts. *Clinical Ophthalmology*, *15*, 2759–2766. https://doi.org/10.2147/OPTH.S319025

Goloha, V., & Bartik, P. (2023). Customized evaluation of special endurance and functionality for optimal health and performance in judo athletes. *Pedagogy of Health*, *2*(1), 30–36. https://doi.org/10.15561/health.2023.0105

Hidayatullah, M. R., & Saputra, S. Y. (2021). Pelatihan Penanganan Cedera Olahraga Melalui Sport Massage Dan Metode Rice. *Abdinesia: Jurnal Pengabdian Kepada Masyarakat*, *1*(Vol 1 No 1 (2021): Abdinesia: Jurnal Pengabdian kepada Masyarakat), 1–5. https://unu-ntb.e-journal.id/abdinesia/article/view/62

Hojjat, H., Svider, P. F., Lin, H. S., Folbe, A. J., Shkoukani, M. A., Eloy, J. A., & Zuliani, G. (2016). Adding Injury to Insult: A National Analysis of Combat Sport-Related Facial Injury. *Annals of Otology, Rhinology and Laryngology*, *125*(8), 652–659. https://doi.org/10.1177/0003489416644617

Hunt, B. J. (2015). The current place of tranexamic acid in the management of bleeding. *Anaesthesia*, *70*(S1), 50–53. https://doi.org/10.1111/ANAE.12910

Irawan, J. R. (2017). The effectiveness of passion fruit juice consumption as pain reliever for bruise trauma in pencak silat athletes. *Jurnal Kesehatan Masyarakat*, *12*(2), 96–101. https://doi.org/10.15294/kemas.v12i2.4385

Karpman, S., Reid, P., Phillips, L., Qin, Z., & Gross, D. P. (2016). Combative Sports Injuries: An Edmonton Retrospective. *Clinical Journal of Sport Medicine*, *26*(4), 332–334. https://doi.org/10.1097/JSM.0000000000000235

Koutures, C., & Demorest, R. A. (2018). Participation and Injury in Martial Arts. *Current Sports*

ISSN 2654-4474 (Print), ISSN 2654-9069 (Online)

Medicine Reports, *17*(12), 433–438. https://doi.org/10.1249/JSR.0000000000000539

Kusuma, K. C. A., Ariani, L. P. T., & Muliarta, I. W. (2023). Implementasi Sport Science Dalam Penanganan Cedera Di Perguruan Silat Satria Muda Indonesia Unit Panji Anom. *Jurnal Widya Laksana*, *12*(1), 142–150. https://doi.org/10.23887/jwl.v12i1.48804

Kusuma, M. N. H., & Novita, N. (2023). Investigating the Causative Factor of Musculoskeletal Injury for Indonesian Traditional Martial Arts. *Physical Education Theory and Methodology*, *23*(2), 185–191. https://doi.org/10.17309/tmfv.2023.2.05

Laoruengthana, A., Poosamsai, P., Fangsanau, T., Supanpaiboon, P., & Tungkasamesamran, K. (2009). The epidemiology of sports injury during the 37th Thailand National Games 2008 in Phitsanulok. *Journal of the Medical Association of Thailand*, *92*(6), 204–210. https://pubmed.ncbi.nlm.nih.gov/20120687/

Latif, R. A., Yusoff, Y. M., Tumijan, W., Linoby, A. F. L. R., & Yoyok, S. (2022). Injury in Martial Art Activities: Focusing on Pencak Silat Athletes. *Ido Movement for Culture*, *22*(2), 53–62. https://doi.org/10.14589/ido.22.2S.7

Latyshev, M., Tropin, Y., Podrigalo, L., & Boychenko, N. (2022). Analysis of the Relative Age Effect in Elite Wrestlers. *Ido Movement for Culture*, *22*(3), 28–32. https://doi.org/10.14589/ido.22.3.5

Lockwood, J., Frape, L., Lin, S., & Ackery, A. (2018). Traumatic brain injuries in mixed martial arts: A systematic review. *Trauma (United Kingdom)*, *20*(4), 245–254. https://doi.org/10.1177/1460408617740902

Melin, A. K., Areta, J. L., Heikura, I. A., Stellingwerff, T., Torstveit, M. K., & Hackney, A. C. (2024). Direct and indirect impact of low energy availability on sports performance. *Scandinavian Journal of Medicine & Science in Sports*, *34*(1), 1–23. https://doi.org/10.1111/sms.14327

Muhibbi, M., Pranata, D. Y., Ramadhan, A. T., & Adila, F. (2023). Identification of sports injuries in semarang city communities based on gender. *Journal of Sport Education (JOPE)*, *5*(2), 158–166. https://doi.org/10.31258/jope.5.2.158-166

Napolitano, L. M., Cohen, M. J., Cotton, B. A., Schreiber, M. A., & Moore, E. E. (2013). Tranexamic acid in trauma: How should we use it? *Journal of Trauma and Acute Care Surgery*, *74*(6), 1575–1586. https://doi.org/10.1097/TA.0b013e318292cc54

Ng, W., Jerath, A., & Wasowicz, M. (2015). Tranexamic acid: A clinical review. *Anaesthesiology Intensive Therapy*, *47*(4), 339–350. https://doi.org/10.5603/AIT.a2015.0011

Pinzon, R. T., & Sanyasi, R. D. L. R. (2018). Systematic Review of Eperisone for Low Back Pain. *Asian Journal of Pharmacy and Pharmacology*, *4*(2), 140–146. https://doi.org/10.31024/ajpp.2018.4.2.7

Riyadi, D. N., Haqiyah, A., & Putranto, A. B. (2023). Android Application Design Based on Biomechanical. *Halaman Olahraga Nusantara (Jurnal Ilmu Keolahragaan)*, *6*(2), 763–776. https://jurnal.univpgri-palembang.ac.id/index.php/hon/article/view/12292

Sobieraj, T., Kaczmarczyk, K., & Wit, A. (2023). Epidemiology of musculoskeletal injuries in combat sports practitioners. *Biomedical Human Kinetics*, *15*(1), 27–34.

ISSN 2654-4474 (Print), ISSN 2654-9069 (Online)

https://doi.org/10.2478/bhk-2023-0004

Sugiyono. (2019). *Metode Penelitian Pendidikan (Kuantitatif, Kualitatif, Kombinasi, R&D, dan Penelitian Pendidikan)*. ALFABETA.

Tok, S. (2011). The big five personality traits and risky sport participation. *Social Behavior and Personality*, *39*(8), 1105–1111. https://dx.doi.org/10.2224/sbp.2011.39.8.1105

Tropin, Y., Podrigalo, L., Boychenko, N., Podrihalo, O., Volodchenko, O., Volskyi, D., & Roztorhui, M. (2023). Analyzing predictive approaches in martial arts research. *Pedagogy of Physical Culture and Sports*, *27*(4), 321–330. https://doi.org/10.15561/26649837.2023.0408

Tulendiyeva, A., Saliev, T., Andassova, Z., Issabayev, A., & Fakhradiyev, I. (2021). Historical overview of injury prevention in traditional martial arts. *Sport Sciences for Health*, *17*(4), 837–848. https://doi.org/10.1007/s11332-021-00785-0

Umaryono, Apendi, P., Hartono, F. V., Sabarudin, E., Handoko, P., & Purnomo, Y. S. (2023). *Pedoman olimpiade olahraga siswa nasional jenjang SD/MI tahun 2023* (D. Meilani, Asrul, D. Sunarko, & U. U. Khasanah (eds.)). Balai Pengembangan Talenta Indonesia, Pusat Prestasi Nasional Kementerian Pendidikan, Kebudayaan, Riset dan Teknolog. https://pusatprestasinasional.kemdikbud.go.id/

White, P. F., Raeder, J., & Kehlet, H. (2012). Ketorolac: Its role as part of a multimodal analgesic regimen. *Anesthesia and Analgesia*, *114*(2), 250–254. https://doi.org/10.1213/ANE.0b013e31823cd524

Wibowo, P., & Za, N. (2023). Fungsi Pelatih dalam Pembinaan Atlet pada Pertandingan Pencak Silat di POMDA 2023 Universitas Malikussaleh. *Jurnal Malikussaleh Mengabdi*, *2*(2), 501–505. https://doi.org/10.29103/jmm.v2n2.15437

Zetaruk, M. N., Violán, M. A., Zurakowski, D., & Micheli, L. J. (2005). Injuries in martial arts: A comparison of five styles. *British Journal of Sports Medicine*, *39*(1), 29–33. https://doi.org/10.1136/bjsm.2003.010322

Zhang, Y. F., & Ning, G. (2008). Mecobalamin. *Expert Opin. Investig. Drugs*, *17*(6), 953–964. https://doi.org/10.1517/13543780802030259

ISSN 2654-4474 (Print), ISSN 2654-9069 (Online)