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Sport Injury and Physiotherapy Services in Indonesian Paralympic Athletes at The Asean Paragames in Cambodia 2023

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Abstract

The ASEAN Paragames Cambodia 2023 was attended by 268 Indonesian paralympic athletes, the largest number compared to the Tokyo 2020 International Paralympic Games with 23 Indonesian paralympic athletes. Paralympic athletes have a higher prevalence of injuries compared to Olympic athletes. Injuries in paralympic sports vary due to the large percentage of disability. However, there is no literature that specifically describes the frequency and percentage of sports injuries in the categories and areas of sports injuries in the region and physiotherapy services in Indonesian paralympic athletes. The method used was a retrospective descriptive epidemiological study with a cross-sectional approach. This method aims to determine the frequency and percentage of sports injuries in sports categories and affected anatomical areas and types of physiotherapy services in a population at one time without making comparisons or connecting between variables. The sports category of Indonesian Paralympic athletes with the highest number and percentage of injuries was Para Athletics (n=57.35.2%). In the category of the area anatomically affected by the injury, the highest number and percentage was the leg (n=36.22.2%). Physiotherapy services provided to paraathletes with the highest number and percentage was stretching (n=77.19.2%). The high frequency of sports injuries in paralympic athletes indicates that more prevention needs to be done in the future, injuries that occur in paralympic athletes can aggravate existing disabilities and can even interfere with the athlete's ability to carry out daily activities, therefore physiotherapy services are needed to support the handling of injuries in paralympic athletes during competition.

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INTRODUCTION

The ASEAN Paragames is a biennial paralympic sporting event involving athletes with disabilities from 11 Southeast Asian countries. The 2023 ASEAN Paragames have been held over one week in Phnom Penh, Cambodia with 1,453 athletes with disabilities representing 11 National Paralympic Committees (NPCs). The ASEAN Paragames is a paralympic event with the largest number of Indonesian paralympic athletes compared to other paralympic events. The number of Indonesian paralympic athletes participating in the ASEAN Paragames Cambodia 2023 event is 268 athletes, this number is more than at the Tokyo 2020 International Paralympic event as many as 23 Indonesian paralympic athletes. The Asean Para Sports Federation (APSF) announced that Indonesia won the overall title for the third consecutive time by collecting 158 gold, 148 silver and 95 bronze to become the overall champion of the 2023 SEA Games (Asean Para Sports Federation, 2023). Strong performances in four sports kept Indonesia ahead of its competitors, earning 28 gold medals in athletics, weightlifting, chess and swimming to remain in the top spot. To monitor and support the physical condition and health of Indonesian paralympic athletes participating in twelve sports including blind chess, blind judo, boccia, CP football, goal ball, para athletics, para badminton, para powerlifting, para swimming, para table tennis, sitting volleyball, and wheelchair basketball, the Indonesian National Paralympic Committee (NPC) brought a medical team consisting of a team of physical medicine and rehabilitation specialists, a team of physiotherapists, and a team of sport masseurs along with medical equipment from the country.

The participation of athletes with disabilities in sport has a positive impact on the athlete's physique and confidence to join the community. While participating in paralympic sport is beneficial, it also carries the potential risk of musculoskeletal injury. One of the causes is a result of repetitive over-exertion with improper movements. Paralympic athletes have a higher prevalence of injuries compared to Olympic athletes (Vitasari et al., 2023). At the 2016 Summer Paralympics, a total of 510 injuries were reported among 441 athletes, with an injury incidence rate of 10 injuries per 1000 athlete-days. This is almost double the rate of 5 injuries per 1000 days. The injury profile in paralympic sport is also highly variable with different classifications of paralympic athletes according to type and degree of disability. This wider range of disabilities may help explain the diverse injury profiles in paralympic sports. However, to date there is no literature that specifically describes the percentage of sports injuries in the affected areas and the type of physiotherapy services provided to Indonesian paralympic athletes at the ASEAN Paragames.

For paralympic athletes, sports injuries can exacerbate existing disabilities and interfere with performing daily activities. Paralympic athletes experience sports injuries associated with specific impairments. For example, proprioception and low bone density and flexibility may increase the risk of injury in visually impaired paralympic athletes (Pinheiro et al., 2021). This high number of injuries means that physiotherapy is increasingly present in the realm of adapted or unadapted sports and plays a crucial role in the healthcare team treating athletes, both amateur and professional, by performing functional assessments of athletes, treating pathological conditions

of the musculoskeletal system, and preventing sports training-induced injuries, with the aim of minimising recurrence and returning athletes as quickly and safely as possible within physiological and clinical limits post-injury. Given that physiotherapists are of utmost importance in the process of physical-functional assessment, treatment and prevention of injuries, return to sport and monitoring of training and competition (Silva et al., 2016).

Overall, sports physiotherapists have an important part to play in maintaining and recovering paralympic athletes around the world. Sports physiotherapists with their knowledge of disability, movement, and body function are needed in athlete support teams during events and competitions. Sports physiotherapists should work closely with their colleagues in the medical field to undertake systematic data collection on injury and disease epidemiology necessary for the development of evidence-based treatment strategies (Pinheiro et al., 2021). The study aims to determine the frequency of sports injuries in the affected area/region and the type of physiotherapy services for Indonesian paralympic athletes at the ASEAN Paragames Cambodia 2023 so that it can be used as a consideration and reference for the future.

METHODS

The method used was a retrospective descriptive epidemiological study with a cross-sectional approach. This method aims to determine the frequency and percentage of sports injuries in sports categories and affected anatomical areas and types of physiotherapy services in a population at one time without making comparisons or connecting between variables. This study was conducted at the physiotherapy polyclinic of NPC Indonesia on 3 to 9 June 2023.

Participants

The population in the study consisted of Indonesian paralympic athletes who participated in the ASEAN Paragames Cambodia 2023 and visited the physiotherapy polyclinic of NPC Indonesia on 3 to 9 June 2023. The sample in this study were Indonesian paralympic athletes who participated in the ASEAN Paragames Cambodia 2023 and suffered sports injuries and received physiotherapy services from NPC Indonesia.

Sampling Procedures

This study uses secondary data because the data obtained is in the form of documentation or reports of injury demographic data on 162 Indonesian paralympic athletes in the ASEAN Paragames Cambodia 2023 event that has been collected previously by the National Paralympic Committee (NPC) Indonesia with details of sports, sports injury diagnoses, regions/areas affected by injury, and types of physiotherapy services.

Design or Data Analysis

The operational definitions of sports injuries and physiotherapy services were sports injuries in the sports category and in the anatomical areas affected by the injury, such as shoulders, thighs, upper back, knees, ankles, elbows, wrists, arms, legs, and hips and physiotherapy services provided in the form of muscle release, stretching, kinesio taping, gun massage, sports massage, cryotherapy, recovery pump, electrotherapy, shock wave therapy, ultrasound, and ethyl chloride spray. Data on the number of Indonesian Paralympic athletes were recorded in Microsoft Excel and then transferred to the Statistical Package for

Social Sciences (SPSS) version 22 programme for data analysis. The data were presented in tabular form and then descriptively analysed to see the frequency results of each data.

RESULT

Data obtained from the NPC Indonesia medical team recorded 162 out of a total of 268 Indonesian Paralympic athletes who participated in the ASEAN Paragames Cambodia 2023, suffered injuries during the competition and have received physiotherapy services by the NPC Indonesia physiotherapy medical team. Based on Table 1, the sports categories of Indonesian Paralympic athletes who suffered injuries with the highest number and percentage were Para Athletics (n=57, 35.2%) then Para Swimming (n=41,2 5.3%), Para Powerlifting (n=15, 9. 3%), Para Badminton (n=14, 8.6%), Para Table Tennis (n=11, 6.8%), Sitting Volleyball (n=8, 4.9%), Cerebral Palsy Football (n=5, 3.1%), Goalball (n=4, 2.5%), Boccia (n=3, 1.9%), Blind Judo (n=3, 1.9%), and Wheelchair Basketball (n=1, 0.6%).

Table 1. Frequency of injured athletes by sport category

No	Sport Category	Frequency	Percentage (%)
1	Blind Judo	3	1.9
2	Boccia	3	1.9
3	Cerebral Palsy Football	5	3.1
4	Goalball	4	2.5
5	Para Athletic	57	35.2
6	Para Badminton	14	8.6
7	Para Powerlifting	15	9.3
8	Para Swimming	41	25.3
9	Para Table Tennis	11	6.8
10	Sitting Volleyball	8	4.9
11	Wheelchair Basketball	1	0.6

Based on table 2, highest injury frequency in the leg (n=36, 22.2%), then Shoulder (n=33, 20.4%), Thigh (n=26, 16%), Upper Back (n=17, 10.5%), Knee (n=16, 9.9%), Lower Back (n=13, 8%), Ankle (n=7, 4.3%), Elbow (n=4, 2.5%), Wrist (n=3, 1.9%), Arm (n=2, 1.2%), Foot (n=2, 1.2%), Neck (n=2, 1.2%), and Hip (n=1, 0.6%).

Table 2. Frequency of injury in the region

No	Region	Frequency	Percentage (%)
1	Ankle	7	4.3
2	Arm	2	1.2
3	Elbow	4	2.5
4	Foot	2	1.2
5	Hip	1	0.6
6	Knee	16	9.9
7	Leg	36	22.2
8	Lower Back	13	8
9	Neck	2	1.2
10	Shoulder	33	20.4
11	Thigh	26	16.0
12	Upper Back	17	10.5
13	Wrist	3	1.9

Based on table 3, the highest frequency of physiotherapy services provided was Stretching (n=34, 21%), then Electrotherapy (n=31, 19.1%), Cryotherapy (n=20, 12.3%), Muscle Release (n=16, 9.9%), Sport Massage (n=16, 9.9%), Kinesio Taping (n=12, 7.4%), Massage Gun (n=11, 6.8%), Recovery Pump (n=10, 6.2%), Ultrasound (n=5, 3.1%), Ethyl Chloride Spray (n=4, 2.5%), and Shock Wave Therapy (n=3, 1.9%).

Table 3. Frequency of physiotherapy services provided

No	Physiotherapy Services	Frequency	Percentage (%)
1	Muscle Release	16	9.9
2	Stretching	34	21
3	Kinesio Taping	12	7.4
4	Massage Gun	11	6.8
5	Sport Massage	16	9.9
6	Cryotherapy	20	12.3
7	Recovery Pump	10	6.2
8	Electrotherapy	31	19.1
9	Shock Wave Therapy	3	1.9
10	Ultrasound	5	3.1
11	Ethyl Chloride Spray	4	2.5

DISCUSSION

The main objective of this study was to examine the frequency of para-athlete injuries in sport categories and anatomical areas affected and the frequency of physiotherapy services provided at the 2023 Asean Paragames in Cambodia. The results of the analysis show that most Indonesian athletes are injured in para athletics (35.3%). Non-disabled athletics athletes experience various injuries, especially in running, jumping hurdles, combination events, and sprint walking. At the same time, for marathon running, they have lower limb muscle injuries, lower limb skin injuries in middle and long distance running (Edouard et al., 2020). The authors report the results of the Edouard et al. study to inform that non-disabled para-athletes are also at risk of injury, especially athletes with disabilities. Para-athletes already have medical challenges related to their disorders that can make them vulnerable to injury (Caudel et al., 2018), just as the combined impact of everyday wheelchair use and sports wheelchair use puts an athlete at excessive risk of injury (Fagher et al., 2020). The results also showed injuries in other sports categories such as Para Swimming, Para Powerlifting, Para Badminton, Para Table Tennis, Field Tennis, Table Tennis Football, Sitting Volleyball, Cerebral Palsy Football, Goal Football, Boccia, Blind Judo, and Wheelchair Basketball.

Analysis of anatomical injury location showed that the highest frequency of injuries to the leg were 22.2%. The results of another study reported at the Tokyo Olympics 2020 that Indonesian para-athletes experienced injuries to the lower limbs (70%), and the type of injury often experienced was sprains/twists. (Hanief et al., 2021). The results also showed injuries to other anatomical areas such as shoulder, thigh, upper back, knee, lower back, elbow, wrist, arm, foot, neck, and hip. Injury types in anatomical areas are described in table 4.

Table 4. Injury types in anatomical areas

No	Region	Type of Injury
1	Ankle	Ankle sprain; ankle ligament tears; ankle fracture (Young et al., 2023)
2	Elbow	Ulnar collateral ligament (UCL) injury; excessive valgus extension; medial and lateral epicondylitis (Hoppe et al., 2022)
3	Finger	Thumb ulnar collateral ligament tear; finger fracture; sagittal band rupture(Avery et al., 2016)
4	Hip	Adductor strain; pubic osteitis; Femoroacetabular impingement (Lynch et al., 2017)

5	Knee	Meniscus injuries; injuries to the medial and lateral collateral ligaments; cruciate ligament injuries; osteochondrosis of the patella; fractures.(Huang & Zheng, 2022)
6	Head/Neck and spine (lower-upper)	Back muscle strain; intervertebral disc injury; spondylolysis; muscle spasm (Young et al., 2023)
7	Shoulder	Stress fracture of the distal humerus of the shoulder; scapular dyskinesia; glenoid dysplasia; deficits in range of motion (ROM) or strength; humeral or glenoid dysplasia, and high capsular laxity (Hoppe et al., 2022)
8	Thigh	strain; rupture; tear (Enoki et al., 2021)
9	Wrist and hand	Triangular cartilage injury; ulnar extensor tendinitis; ulna fracture; Tear of triangular fibrocartilage complex; radial side tendinopathy; scaphoid fracture (Avery et al., 2016)
10	Foot	bruise; haematoma; contusion; tendinosis; tendinopathy; fascia; aponeurosis injury (Enoki et al., 2021)

Analysis of physiotherapy services showed that stretching (21%) was the most frequently provided to para-athletes. Stretching is the movement of reaching the joint range of motion (ROM) of one joint or several joints and then the muscles are stretched for a certain time. Stretching can be done actively by agonist muscle contraction or by using gravity (Arntz et al., 2023). In another study, static stretching had a positive impact on range of motion in the short and long term. Static stretching is recommended for muscle injuries and ligament injuries. No influence in either direction was assumed for bone injuries In addition to static stretching, dynamic stretching is recommended for range of motion improvement in acute and chronic conditions of muscle and ligament injuries and injury prevention. However, dynamic stretching had no impact on bone injuries (Warneke et al., 2024).

Other physiotherapy services provided included Electrotherapy, Cryotherapy, Muscle Release, Sports Massage, Kinesio Taping, Massage Gun, Recovery Pump, Ultrasound, Ethyl Chloride Spray, and Shockwave Therapy. In this study, a total of 11 types of physiotherapy services were provided to para-athletes. The types of Physiotherapy Services are described in table 5.

Table 5. Type of physiotherapy services provided

No	Physiotherapy services	Description
1	Muscle Release	Compression techniques on fascial tissue to reduce tension and alleviate pain in muscle tissue (Balasubramaniam et al., 2022)
2	Stretching	Stretching reaches the joint range of motion (ROM) of one joint or several joints and then the muscle is stretched for a specified time. Stretching can be done actively with agonist muscle contraction or by using gravity (Arntz et al., 2023)
3	Kinesio Taping	An impermeable tape that can stretch

		as much as 120%-140% of its initial length. This method is becoming a effective treatment.(Liu et al., 2020) Kinesio taping is used for injury treatment, joint stabilization, and pain reduction (Andrýsková & Lee, 2020)
4	Massage Gun	Hand-held mechanical devices are shaped like small hammers, powered by electricity or batteries, using applicator tips of different shapes (e.g., balls, flat tips, tapered tips, and forks). It uses percussion with rapid tip movements to apply pressure/vibration to myofascial tissue which can increase blood flow, reduce myofascial tension, increase range of motion in joints, and decrease pain. (Ferreira et al., 2023)
5	Sport Massage	Sports massage is defined as a collection of massage techniques that aim to minimise negative effects such as cramping and fatigue after exercise. There is a wide range of pressure that has been shown to elicit different responses, effects and neurological such as stimulating
		innervation especially peripheral nerves, increasing sensitivity to stimuli and muscle elasticity (Rini & Purnomo, 2021)
6	Cryotherapy	Cold therapy both locally and systemically to alleviate symptoms of various ailments including inflammation, pain, muscle spasms, and chronic inflammation and injury (Lombardi et al., 2017)
7	Electrotherapy	Electrotherapy is a device that uses small electrical impulses to stimulate muscles, improve sensation and increase strength in the muscles. Electrotherapy provides pain relief through segmental inhibition via the pain gate mechanism (Liaghat et al., 2023)
8	Shock Wave Therapy	Medical treatment with shockwave therapy that produces mechanical effects to promote tissue healing, and has an analgesic effect to produce an increase in pain-blocking substances (Schroeder et al., 2021)
9	Ethyl Chloride Spray	The use of ethyl chloride spray for injury treatment in sporting events to reduce inflammation and produce a cooling effect on the

	soft tissue injury area. ethyl chloride spray produces cold, relaxing effects and also reduces inflammatory reactions in soft tissue injuries (Gilani et al., 2020)

CONCLUSION

The high frequency of sports injuries in paralympic athletes indicates that more prevention needs to be done in the future because injuries that occur in paralympic athletes can worsen existing disabilities and can even interfere with the athlete's ability to carry out daily activities, therefore physiotherapy services are needed to support the handling of injuries in paralympic athletes during the competition. The role of physiotherapists in sports is very broad, because in addition to providing services to athletes against injuries also provide assistance in the maintenance and recovery of an injury, which is why it is necessary to create an injury control and recording system to provide more detailed information. Athletes with disabilities are more susceptible to sports injuries when there are intrinsic factors, such as impaired strength, balance, gait, coordination, sensitivity, tone, flexibility, and anatomical misalignment that often lead to overload of functionally unaffected segments.

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