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Risk Level of Exercise Posture on Musculoskeletal Disorder in Petanque Athletes

Arimbi[1]✉, Andi Ainun Zulkiah Surur[2],Ulfah Widyastuti Arsal[3], Andi Sri Dewi Anggraeni[4]

Fakultas Ilmu Keolahragaan dan Kesehatan, Universitas Negeri Makassar, Indonesia[1234]

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Abstract

This study aims to analyse the risk level of exercise posture on musculoskeletal disorders (MSDs) at the Faculty of Sports and Health Science , Makassar State University (UNM). Petanque requires athletes to perform repetitive movements and maintain certain body positions, especially when throwing, which can potentially cause musculoskeletal disorders. This study employs a descriptive observational design with a cross-sectional approach. Data were obtained through direct observation of athletes' working posture during activities and analysed using the Rapid Upper Limb Assessment (RULA) method to assess the level of posture risk for musculoskeletal complaints. The results of the analysis showed that most athletes were in the low to moderate risk category, especially in the back, upper arm and wrist, caused by non-ergonomic body positions when throwing. Based on these results, it can be concluded that the posture of petanque athletes contributes to an increased risk of musculoskeletal disorders, thus requiring attention to the application of ergonomic principles and improvement of posture techniques in training to reduce the potential for musculoskeletal injuries.

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✉ Correspondence address :
E-mail: arimbi@unm.ac.id

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INTRODUCTION

Sport is physical activity that provides benefit to fitness physical and mental health. Sports petanque is something form game boules whose goal throwing iron balls as close as possible Possible with ball wood called cochonnet /jack/ boka and the feet must be be in the small circle. Sports petanque has significant developments in Indonesia, especially in college. Although, this sport looks simple in its implementation, pétanque need technique precision and complexity that can give significant impact on the musculoskeletal system of athletes (Decheline & Sukendro , 2019).

In addition, sports can give various benefit for health both physically and mentally, but if we doing with a bad technique and posture, can cause risk injury especially on the musculoskeletal system consists of on muscles,bones,joints,ligaments, and tissues that support others who play a role important in stability and movement body. Disorders of the system, which is known as Musculoskeletal Disorders (MSDs), can causes pain, tension , decreased strength , and limitations movement in parts body (Ilmidin et al., 2024).

Strength muscle in petanque used for moving arm objective for throw the ball to direction target. Without muscle power, athletes can't move or thrown the ball far . Effectiveness throw (carreau shot) namely accuracy and speed throws at a distance of 6-7 meters depend heavily on strength muscle and speed movement arm . Biomechanics petanque involving analysis movement body, especially movement throwing the ball that demands coordination muscle lower extremities, power arms, flexibility wrist, and stability. In addition, proper biomechanics in athletes petanque can reduce possibility injuries, as well as give evaluation for repair movement when happen obstacles. There are two aspects important in biomechanics petanque that is strength muscle and speed movement for get accurate and optimal shooting results (Irawan et al., 2024).

Good posture with principles ergonomics hove important role prevent painful musculoskeletal in players petanque. fatigue muscle often caused by risk factors ergonomics environment. In addition, regular exercise is carried out to influence muscles stabilization. Therefore, weak muscles make system musculoskeletal not stable and gives risk to pain (Colak et al., 2021).

Based on ergonomics studies, work posture have a significant effect to musculoskeletal disorder for workers industry and athlete. Body Position that is not neutral and doing in long duration causes improvement static load on muscles so that bother circulation blood and accelerate fatigue muscles (Bahiyyah & Putra, 2024). Although, lots research that examines work posture in the sector industry, application study ergonomics in the field sports, in particular petanque still relatively limited. In fact, the implementation of principle ergonomics in sports can help prevent injury , increase comfort , as well as support performance athlete in a way overall (Ekawati et al., 2021).

Rapid Upper Limb Assessment (RULA) methods used for evaluate risk level posture to disturbance upper extremities and others , through observation position upper arm, lower arms, wrist hands , neck and back as well as factor style and repetition (Oesman, 2019). Although part big literature ergonomics focused on the environment industry or manual work , application in activities sport like petanque Still seldom published. Therefore, that research for analyze risk musculoskeletal disorders due to posture moment exercising in athletes petanque Faculty of Sports and Health Science Makassar State University, with using RULA method as tool for evaluation work posture. Research results expected can give runway for implementation intervention ergonomics, settings technique training and coaching more posture good for reducing potential musculoskeletal injury in athletes.

METHODS

This study is study descriptive observational with approach cross sectional research This aim for knowing risk of musculoskeletal disorders consequence posture position when doing exercise in athletes petanque Faculty of Sports and Health Science Makassar State University in one time period without existence intervention. Sample was using purposive sampling method with total sample in study This namely 48 people based on criteria inclusion and exclusion that have been set researcher. Instrument study use Rapid Upper Limb Assessment (RULA) for evaluate posture body upper and identify risk musculoskeletal disorder in the extremities over which will show level risks and provide recommendation action repair.

RESULTS AND DISCUSSION

Petanque is a sport that involves repeatedly throwing a ball. This activity engages the upper limb muscles, such as shoulders, upper arms, el-

bows, and wrists. However, repetitive movements with bad technique and posture can potentially place excessive strain on the upper limb muscles, thereby increasing the risk of musculoskeletal pain.

Several factors influence performance, namely: Athlete factors (load, duration, mass); Individual factors (body posture, static and dynamic, age, gender, smoking habits, BMI, physical strength); and Environmental factors (training environment temperature). To avoid the risk of MSDs during exercise, there are several things to avoid. Do not twist or bend your body sideways, do not move, push, or pull carelessly, as this can increase the risk of injury. If the reach is not sufficient, do not move the object. Warm up and cool down before and after exercising (Thamrin,2021).

Table 1. Distribution of Risk Levels Posture Work Based on Rapid Upper Limb

RULA Category	Total (N = 48)	
	n	%
No Risk	0	0
Risk Low	22	45.8
Moderate Risk	19	39.6
High Risk	7	14.6

Based on **Table 1**, 22 (45.8%) subjects were in the low-risk category, 19 (39.6%) were in the medium-risk category, and 7 (14.6%) were in the high-risk category. No subjects were classified as low-risk. Thus, the majority of petanque players In this study, there were work postures that had the potential to cause moderate to high levels of musculoskeletal risk, thus requiring attention in preventing injuries.

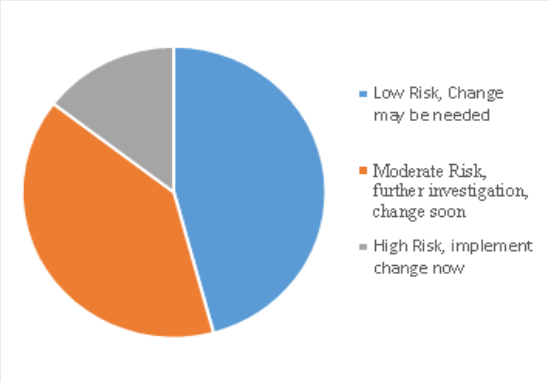

Figure 1. Analysis of the level of risk of posture when playing petanque

From this **Table 2**, The RULA assessment results for each body segment showed that the upper arm had a dominant score of 3 (100%), indicating a flexion position of 45–90° and was categorized as abnormal. The forearm obtained a dominant score of 2 (64.6%), indicating a flexion position of less than 60° and was categorized as almost normal. The wrist received a dominant score of 3 (97.9%), indicating a moderate deviation or bending, so it was not in a neutral position. Wrist The twist received a dominant score of 1 (97.9%), indicating a relatively neutral position. The neck received a dominant score of 0 (100%), indicating a normal position without significant flexion or extension. The trunk received a dominant score of 5 (66.7%), indicating a bent position of more than 60° and placing a heavy load on the spine. These results indicate that the body posture when playing petanque is good. causing high biomechanical loads especially on the upper extremities and spine.

Table 2. Assessment Results Rapid Upper Limb Assessment (RULA) per Segment Body

Segmen Body	Dominant Score	Dominant Score	Interpretation Posture
Upper Arm	3	100%	Flexibility between 45–90° (not normal)
Lower Arm	2	64.6%	Flexion < 60° (almost normal)
Wrist	3	97.9%	Deviation / bending moderate (not neutral)
Wrist twist	1	97.9%	Position relatively neutral (minimal rotation)
Neck	0	100%	Normal, position neutral There is
Trunk	5	66.7%	Bending > 60°, load weight on the bones behind

Assessment results posture Work using RULA shows that more from half subject is in the category risk currently until high . Dominant score found on the upper arm (score 3) which indicates shoulder flexion 45–90°, wrist (score 3) which indicates deviation wrist hands , and trunk (score 5) due to position bow more from 60°. Postures This nature No ergonomic and has proven increase risk occurrence disturbance musculoskeletal . RULA is a valid method for evaluate exposure posture risk to the extremities above and has Lots used in literature ergonomics Work and sport .

Study This in line with results study from Akbar et al., (2023) who said that position ergonomic or posture Work can become factor risk in MSDs incidents among workers , although in study the only conducted a review on the subject special worker farmers in Southeast Asia, however study it also proves that the workers who have posture work that is not ergonomic can influence future MSDs incidents . Other studies that are in line with study it also says that posture Work including posture clumsy can cause MSDs incidents among workers , research This was carried out in China and found existence difference significant on workers women and men

Pain level of MSDs varies among the workers , such as dentist generally feel painful part in lower back/low back pain (LBP), shoulders, and neck (Soo, et al, 2023. In manufacturing generally get pain in the neck , shoulders, and ankles (Chen Et al, 2021). The research in the campus area special worker security , staff catering , staff library , technician , driver , and cleaner obtained that most complaints felt in LBP and wrist hand (Tembo, 2023). Meanwhile results in study This found the most frequent complaints namely in the trunk, upper arm and wrist areas. Differences in the location of the complaint is very related with dominant movements and areas where repetitive movements are carried out posture not enough appropriate .

Draft ergonomics will highlight importance understand and adapt posture Work For reduce risk injury and comfort work (Djaali, 2020). Analysis posture Work refers to the position body moment do tasks work that can cause discomfort and fatigue (S alleh ,2022) Therefore that , is necessary purposeful analysis For evaluate level safety posture Work as runway For repair condition Work workers . Analysis posture Work become effective tool For evaluate activity work and identify areas that require improvement (Herwanto, 2023).

CONCLUSION

This study shows that the posture of petanque athletes at Faculty of Sports and Health Science Makassar State University, contributes to the risk of musculoskeletal disorders (MSDS), especially in the back, upper arms, and wrists, due to bad ergonomic positioning when throwing. Although the level of risk found is generally low to moderate, it still requires attention. Therefore, the application of ergonomic principles and improvements in body posture techniques during training are essential to reduce the potential musculoskeletal injuries and maintain optimal athlete performance.

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