

Factors Associated with Musculoskeletal Disorders in Pétanque Athletes

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Abstract

Disorders of the musculoskeletal system are an accumulation of small and large symptoms that take place continuously for a relatively long time. Pétanque sports combine movements into one such as walking, throwing, and squatting in a relatively long time with low intensity. Methods: This study used an observational analysis with a cross-sectional design. The research population is the Pétanque athletes in Makassar City in 2021, totaling 30 people. The sample used is total sampling. Collecting data using a questionnaire, Nordic Body Map, and observation. Results: the results of this study show that musculoskeletal disorders can occur due to factors such as frequency, intensity and type of exercise performed by athletes. Conclusion: exercise frequency, exercise intensity, and type of exercise have a relationship with complaints of musculoskeletal disorders in Petanque athletes.

Keywords: musculoskeltal disorder, atlet petangque, exercise

1 Introduction

Musculoskeletal disorders (MSDs) are a group of symptoms or disorders related to muscle tissue, tendons, ligaments, cartilage, the nervous system, bone structure, and blood vessels. MSDs initially cause aches, pains, numbness, tingling, swelling, stiffness, tremors, sleep disturbances, and burning sensations.[1] According to NIOSH (1997), musculoskeletal disorders (MSDs) are a group of pathological conditions that affect the normal function of the soft tissues of the musculoskeletal system, which includes several parts such as nerves, tendons, muscles, and supporting structures such as the intervertebral discs.[2] Musculoskeletal disorders are also commonly referred to as injuries to the musculoskeletal system. Musculoskeletal disorders are chronic in nature because they are caused by damage to tendons, muscles, ligaments, joints, nerves, cartilage, or spinal discs, usually causing discomfort, pain, itching, and weakening of function. These complaints are triggered by various factors, one of which is the athlete factor, such as excessive muscle stretching, unnatural working postures, repetitive movements, and the environment around the workplace, such as vibration, pressure, and microclimate.[3]-[5] Much research has been conducted on musculoskeletal disorders, and the results of the studies obtained show that the most common skeletal muscle complaints experienced by athletes are in the waist and

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shoulders.[6], [7] Work activities that are repetitive and continuously carried out with the wrong work posture can result in musculoskeletal disorders. Disorders of the musculoskeletal system almost never occur directly but are an accumulation of small and large symptoms that occur continuously over a relatively long time. This can happen in a matter of days, months, or even years, depending on the severity of the trauma, resulting in a fairly large injury, which is then expressed as pain or tingling, tenderness, swelling, and hampered movement or weakness in the tissue of the limb affected by the trauma.[8], [9] Tissue trauma can arise due to chronicity or repetition of the causative process. Musculoskeletal disorders in athletes are generally caused by several factors, such as gender, age, training frequency, training intensity, type of training, and duration of training.[10], [11] The sport of petanque originates in France. This sport was originally a traditional sport from France, then developed as an achievement sport, a traditional game with the parent sport of International Petanque called the Fédération Internationale de Pétanque et Jeu Provencal (FIPJP), which was founded in Marseille, France, in 1958.[12], [13] Petanque sports combine movements into one, such as walking, throwing, and squatting, for a relatively long time with low intensity. Petanque sports combine movements into one, such as walking, throwing, and squatting, for a relatively long time with low intensity.[14] The researchers will conduct research on factors associated with musculoskeletal disorders in petanque athletes.

1,1 Muscle Contraction

According to Winarto, muscle is a connective tissue whose main task is to contract, which functions to move parts of the body, whether consciously or unconsciously. About 40% of the body's weight is muscle, and the human body has more than 600 skeletal muscles. Contractions occur through a sliding filament mechanism due to the formation of a crossbridge composed of myosin and actin filaments, which will pull the actin towards the myosin (middle). The power to pull is obtained from the ATP available in the myosin heads and will be activated when the action potential reaches the muscle. Muscle contractions can occur due to the shortening of the myofibrils due to motor nerve impulses. First, commands are issued from the brain in the motor area, and then, through the spinal nerves, nerve impulses are transmitted to receptors in the muscles in the form of motor-end plates. Muscle fibers consist of two types of fibers: type I muscle fibers, slow fibers, red fibers, or slow oxidative fibers (slow-twitch muscle fibers), and type II muscle fibers, fast fibers, white fibers, or anaerobic muscle fibers (fast-twitch muscle fibers). Type II fibers are still divided into two types, namely type IIa and type IIb. So, it can be classified into 3 types of muscle fibers, namely type I (slow twitch oxidative), type IIa (fast twitch oxidative), and type IIb (fast twitch glycolytic).[15]–[17]

1.2 Musculoskeletal Disorders

Musculoskeletal disorders (MSDs) are a group of symptoms or disorders related to muscle tissue, tendons, ligaments, cartilage, the nervous system, bone structure, and blood vessels. MSDs initially cause aches, pain, numbness, tingling, swelling, stiffness, shaking, sleep disturbances, and burning. Complaints of the musculoskeletal system generally occur due to excessive muscle contraction due to a heavy workload with a long duration of loading. On the other hand, muscle complaints may not occur if muscle contractions are only around 15-20% of maximum muscle strength.[18] However, if muscle contraction exceeds 20%,

then blood circulation to the muscle is reduced according to the level of contraction, which is influenced by the amount of force required. The oxygen supply to the muscles decreases, the process of carbohydrate metabolism is hampered, and as a result, there is a buildup of lactic acid, which causes muscle pain. In general, muscle complaints can be divided into two categories: 1. temporary complaints (reversible), namely muscle complaints that occur when the muscles receive a static load; however, these complaints will immediately disappear if the load is stopped; 2. Persistent complaints, namely persistent muscle complaints, continue even though the workload has been stopped.[19], [20]

There are several types of MSDs, namely, Carpal Tunnel Syndrome (CTS) is a pressure disorder on the nerves that affects the nerves. Carpal Tunnel Syndrome (CTS) is a pressure disorder on the nerves that affects the middle nerve, one of the three nerves that supply the hand with sensory and motor abilities. The CTS at the wrist is a tunnel formed by the carpals, bones on three sides, and ligaments that cross them; Hand-Arm Vibration Syndrome (HAVS) is a disorder of the blood vessels and nerves in the fingers caused by vibrations of tools or parts or surfaces of objects that vibrate and spread directly to the hands. Also known as vibrations that cause white fingers, traumatic vasospastic disease; Low Back Pain Syndrome (LBP) is a common form of most pathological conditions that affect the bones, tendons, nerves, ligaments, and intervertebral discs of the lumbar spine (spine); Peripheral Nerve Entrapment Syndrome is the entrapment of nerves in the hands or feet (sensory, motor, and autonomic nerves); Peripheral neuropathy is a hidden and insidious early symptom of dysesthesia and an inability to perceive sensation; Tendinitis and Tenosynovitis Tendinitis is inflammation of the tendons, the binding structures that attach each end of the muscle to the bone. Tenosynovitis is inflammation of the tendon that also involves the synovium (protection of the tendon and its lubricant). [21], [22]

Stages of musculoskeletal disorders (MSDs). Symptoms that indicate the severity of MSDs can be seen at the following levels: First stage: pain and fatigue appear during work, but after resting they will recover and do not interfere with work capacity. Second stage: The pain persists overnight and interferes with rest. Third stage: the pain persists even though you have had adequate rest; pain when doing repeated athletes; sleep becomes disturbed; difficulty carrying out athletes, which ultimately results in incapacity. Symptoms of musculoskeletal disorders (MSDs). [23]

According to Sherif (2021), the symptoms of MSDs that a person usually feels are: a. The neck and back feel stiff. b. Shoulders feel painful, stiff, or lose flexibility. c. Hands and feet feel pain like being stabbed. d. Elbows or ankles experience pain, swelling, and stiffness. e. The hands and wrists feel symptoms of pain or tenderness accompanied by swelling. f. Fingers lose their mobility, become stiff, lose strength, and lose sensitivity. g. The feet and heels feel tingling, cold, stiff, or hot.[24]

The Nordic Body Map (NBM) method is a very subjective assessment method, meaning that the success of its application is very dependent on the conditions and situations experienced by the athlete at the time it is carried out. To obtain an overview of MSDs symptoms, you can use the Nordic Body Map method. Research also depends on the expertise and experience of the observer concerned. The Nordic Body Map questionnaire has been widely used by ergonomists to assess the severity of disorders of the musculoskeletal system and has sufficient validity and reliability.[25]

The Nordic Body Map questionnaire is a form of ergonomic checklist questionnaire. Another form of ergonomics checklist is the International Labor Organization (ILO) checklist. However, the Nordic Body Map questionnaire is the one most often used to determine discomfort in athletes, and this questionnaire is most often used because it is standardized and neatly structured. This questionnaire uses images of the human body, which has been divided into nine main parts, namely the neck, shoulders, upper back, elbows, lower back, wrists and hands, waist and buttocks, knees, and heels and feet. Risk Factors for Musculoskeletal Disorders (MSDs) The cause-and-effect relationship between the factors that cause MSD complaints is not yet known with certainty and is difficult to explain because there are many factors that might influence it, namely athlete factors, individual factors, and environmental factors.[25]–[27]

Athlete Factors (load, duration, mass) Individual factors (body posture, static and dynamic, age, gender, smoking habits, BMI, physical strength) Environmental factors (training environment temperature) Control is generally divided into three categories: a. reduce or eliminate potentially hazardous conditions using engineering controls; b. change work practices and management policies, which are often called administrative controls; and c. use personal protective equipment. In order not to experience the risk of MSDs when playing sports, there are several things that must be avoided. These are: (1). Do not twist or bend your body to the side. (2). Do not move, push, or pull carelessly, as this can increase the risk of injury. (3). Don't hesitate to ask people for help. (4). If the range is not sufficient, do not move the item. (5). If the item you want to move is too heavy, don't continue. (6). Warm up and cool down before and after exercise.[28]

1.3 The Essence Of The Petangque Sport

Petanque is a new sport in Indonesia, but this sport is a well-known sport (FOPI, 2011). Petanque is a sport that originates in France. This sport first entered Indonesia in 2011 at the SEA Games event in Palembang. This sport requires dexterity in throwing a ball made of metal to approach a target ball made of wood or plastic. The original form of this game appeared in 1907 in La Ciotat, in Provence, southern France. The history of the name Petanque comes from Les Ped Tanco, which means "Legs Meeting" Petanque is a sport that requires optimal technique to win the game, as well as good mental and physical condition. Based on sports mechanics, petanque is a sport that aims to achieve maximum accuracy. Throws carried out in the sport of petanque generally apply a parabolic motion, where the consistency of power when throwing and the angle of the throw are the keys to achieving a certain horizontal distance.

2 Method

This study used observational analysis with a cross-sectional design. The research population is the Petangque athletes in Makassar City in 2021, totaling 30 people. The sample used is a total sample. In this study, the equipment used for data collection and its supporters are: Respondent characteristic questionnaire The respondent identity questionnaire sourced

from Thamrin (2021) is a tool used to obtain primary data in the form of name, age, length of service, weight of burden, and MSDs complaints; it is called the Nordic Body Map Questionnaire (NBM).[1] Data were collected using observation sheets, which were checked using the NBM method, namely detecting pain in 28 musculoskeletal areas. This NBM questionnaire has been widely used by ergonomists to assess the severity of disorders of the musculoskeletal system, issued by OSHA; and cameras, bows, and writing implements. Data processing was performed using SPSS.

3 Results And Discussion

The result of a simple correlation between training frequency and MSDs complaints in Petangque athletes from Makassar City is P = 0.00, so there is a correlation between training frequency and MSDs complaints. The result of a simple correlation between exercise intensity and MSDs complaints was P = 0.00, so there was a correlation between exercise intensity and MSDs complaints. This study found that there was a significant relationship between exercise frequency, exercise intensity, and type of exercise and complaints of musculoskeletal disorders among Petangque athletes in Makassar City.

There is a significant relationship between exercise frequency and MSDs complaints. The results of the study showed that there was a significant relationship between training frequency and complaints of musculoskeletal disorders among Petangque athletes in Makassar City (P < 0.05). When these results are associated with the framework and theoretical studies that underlie them, then the results of this study basically support the existing theory. Amaranta's research (2021) states that one of the risk factors is training variables and the training environment. Musculoskeletal and overuse injuries are associated with the high frequency and intensity of training most athletes attack, especially if involved in pre-season conditioning and matches. However, this can also occur when pathological or biological conditions make the musculoskeletal system unable to cope with mechanical loads, even if the mechanical loads are moderate. [29] This can be explained by the fact that if an athlete exercises with an irregular training frequency, they will be at higher risk of experiencing complaints of musculoskeletal disorders. There is a significant relationship between exercise intensity and MSDs complaints.

The results of the study showed that there was a significant relationship between training intensity and complaints of musculoskeletal disorders among Petangque athletes in Makassar City (P < 0.05). This relationship seems to be because the intensity of training in this case is related to complaints of musculoskeletal disorders in athletes. Silvia's research (2020) stated that musculoskeletal disorders play an important role in the health and success of athletes in sports; MSDs are a major cause of disability, and back pain is a common problem among athletes. Back pain and spinal injuries can occur in athletes due to repetitive, excessive, and unilateral body loads during sports training.[30] This proves that this hypothesis is accepted. Thus, it can be stated that training intensity is one of the elements that influences an athlete to experience fatigue, resulting in complaints of musculoskeletal disorders in Petangque athletes from Makassar City. There is a significant relationship between exercise intensity and MSDs complaints.

The results of the study showed that there was a significant relationship between the type of training and complaints of musculoskeletal disorders among Petangque athletes in Makassar City (P < 0.05). This relationship seems to be because the type of training in this case is related to complaints of musculoskeletal disorders in athletes. In Dilip (2017), one of the factors associated with musculoskeletal injuries in young athletes relatively more

consistently is a sudden increase in the intensity, duration, and volume of physical activity with different types of training.[31] Thus, it can be stated that the type of training is one of the elements that influences an athlete to experience fatigue, resulting in complaints of musculoskeletal disorders in Petangque athletes from Makassar City.

4 Conclusion

Complaints of musculoskeletal disorders are related to the frequency, intensity, and type of training among Petangque athletes.

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