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The Effect Of Warming Up On Musculoskeletal Injuries In Cyclists

Najaah Cetta Ugama[1], Rahajoe Imam Santosa[2], Raden Roro Shinta Arisanti[3]
[1,2,3]Faculty of Medicine, Ciputra University, Surabaya, Indonesia

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ABSTRACT

Musculoskeletal injury is a condition of trauma or damage that affects the function of the movement system, a complex musculoskeletal system of body tissue which is responsible for supporting movement involving the skeleton, muscles, joints, ligaments, tendons and spine. Cycling can have a risk of musculoskeletal injury if the technique and timing are not right. Most injuries to cyclists occur due to using the wrong technique and not doing enough warm-up. Cycling is very important to pay attention to warming up before doing the activity to reduce the risk of injury. There are factors that influence injury when cycling, such as not understanding the importance of warming up when exercising. Cyclists who experience injuries will cause a decline in physical function and create a feeling of trauma, resulting in decreased physical activity and poor performance. Objective: To determine the effect of warming up on the risk of musculoskeletal injuries in cyclists. Method: This research used a descriptive observational research type with a cross sectional research design approach followed by a chi square test to determine the relationship between warming up and musculoskeletal injuries. Results: Around 87.5% of cyclists who did not warm up experienced injuries, while only 13% of cyclists who did warm up experienced injuries. This shows that cyclists who warm up before cycling have a lower risk of injury. Conclusion: Musculoskeletal injuries that occur in cyclists at Taman Bungkul Surabaya are caused by a lack of warm-up and have a higher risk of injury.

Email :
natama.purwito@gmail.com
imam.santosa@ciputra.ac.id
shinta.arisanti@ciputra.ic.id

1. INTRODUCTION

Physical activity is any movement of body parts produced by skeletal muscles that requires energy expenditure according to the capabilities of the body's organs. Physical activity refers to all movement including during leisure or recreational time, transportation to and from a place, as part of a person's sport and work. WHO states that moderate and vigorous intensity physical activity improves health. (WHO, 2022). Physical activity helps the body to maintain the body's functional abilities, cardiorespiratory endurance and mobility abilities. Physical activity can cause injury if done excessively and without measuring the body's capabilities, including strains, sprains, fractures and chronic degenerative conditions. (Wahyuni, 2014).

Sport is defined as physical activity that is structured, regular, planned and continuous or repeated over several months. Exercise aims to increase fitness and endurance as well as maintain or improve body components related to strength, agility and balance (Amriyana & Mufa, 2018). The sports component consists of FITT (Frequency, Intensity, Type, Time), namely: frequency, intensity, form of exercise and duration/time. Frequency of physical activity is the number of days per week planned for exercise or describes the number of repetitions of movements performed in one set of movements. Intensity is a statement of the severity of the training load when the sport is carried out. Time or duration is the length of time an activity is used to exercise. Type is the type of physical activity or sport carried out. (Thompson, PD, et al., 2013).

Sports activities have stages that need to be carried out to minimize the occurrence of injury, such as warming up and cooling down. When exercising, it is very important to pay attention to

warming up before doing activities to reduce the risk of injury. (Astiati, et,al., 2021). There are factors that influence injuries during sports, such as not understanding the importance of warming up when exercising. A person who experiences an injury will cause a decrease in physical function and create a feeling of trauma, resulting in decreased physical activity and poor performance. (Fadhli, et al., 2020)

The sport of cycling is currently popular among the public and can pose a risk of musculoskeletal injury if the technique and timing are not correct, as well as choosing a location that does not cover the terrain. Most injuries to cyclists occur due to incorrect technique. Injuries to cyclists are often caused by the tempo, speed and continuous movement of pedal strokes which predispose cyclists to muscle tension, impacts and falls. (Pratiwi R, 2020).

Risks that can occur when doing physical activity cycling include cramps, strains, sprains, muscle pain and muscle injury. Paresthesia when cycling can occur when the body performs activities that exceed the body's capacity and does not master the technique correctly, for example not changing position or staying still for a long time while cycling, which can cause pressure on the nerves resulting in tingling. Common causes of injury during sports are lack of stretching and warming up, exceeding the body's capacity, lack of rest, use of inappropriate equipment such as not using personal protective equipment, namely safety helmets and appropriate cycling shoes, poor exercise techniques, muscle and joint weakness. , as well as a lack of body flexibility (Lesmana, 2019). Musculoskeletal injuries in cycling can occur in all parts of the body, for example the back, hands, wrists, thighs, knees and ankles. (Jones & Wilson, 2019).

2. METHOD

This research was conducted in the city of Surabaya, precisely at Taman Bungkul Surabaya from 1 July to 31 July 2023. The method used in this research was descriptive with a cross-sectional research design approach. This research is a categorical descriptive analytical observational research which is a research that analyzes the relationship of variables. This study aims to examine the effect of warming up on musculoskeletal injuries in cyclists, using an approach and collecting data through questionnaires to clearly see the effect of warming up on musculoskeletal injuries. The research population is all the elements or units that want to be researched (Syahdrajat, 2018). This research population uses cyclists in Surabaya and the research sample is obtained from the sample criteria population. This research uses a sample of cyclists in Bungkul Park, Surabaya. Based on the sample formula and calculations above, the sample size is 29 respondents. Researchers took 30 respondents with inclusion criteria (1) cyclists of all genders in Taman Bungkul Surabaya, (2) aged more than 20 years, and (3) for the period 1 July to 31 July 2023. Meanwhile, the exclusion criteria in the research These are cyclists who are experiencing musculoskeletal injuries and impaired memory and way of thinking. The independent variable in this study is the effect of warming up while the dependent variable is musculoskeletal injury.

Research data was collected using primary data in the form of warm-up data before cycling, age data through interviews with questionnaires, and informed consent data for respondents. The following are the research procedures:

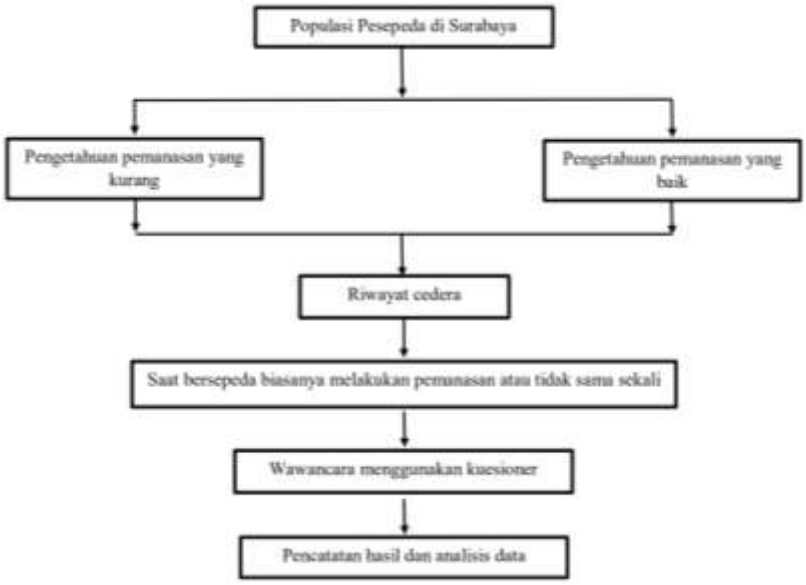

Figure 1 Research Procedure

This research was conducted on a population of cyclists over 20 years of age and all genders in the city of Surabaya. This research procedure aims at cyclists who have good warm-up knowledge and poor warm-up knowledge who have the habit of warming up or not warming up at all. This research was carried out using an interview method using a questionnaire regarding the effect of warming up on musculoskeletal injuries in cyclists. Next, take and collect samples of respondent questionnaires and manage the overall analysis of questionnaire data, compiling a report on the research results that have been obtained.

Data analysis in this study was carried out by univariate analysis to describe the characteristics of each variable studied, namely the effect of warming up before cycling and musculoskeletal injuries using a frequency distribution table, while bivariate analysis was carried out to assess the relationship between the effect of warming up on musculoskeletal injuries in cyclists. The data scale for musculoskeletal injury conditions is nominal, so the statistical test chosen is the chi square statistical test carried out with two variables where the data scale for the two variables is nominal.

3. RESULTS AND DISCUSSION

The description of the characteristics of cyclists in Taman Bungkul Surabaya who are the samples for this research will be described using a frequency distribution table in percentage form with the following results:

Table 1 Characteristics of Cyclists in Taman Bungkul Surabaya

Variable	Frequency (n=31)	Percentage (%)
Gender		
Man	15	48.4
Woman	16	51.6
Age Group (Mean = 37; Min = 20; Max 59)		
20-25 Years	8	25.8
26-35 Years	7	22.6
36-45 Years	5	16.1
46-59 Years	11	35.5
Level of education		
JUNIOR HIGH SCHOOL	4	12.9
SMA/SMK equivalent	16	51.6
College	11	35.5
Understand warm-up		
No	8	25.8

Variable	Frequency (n=31)	Percentage (%)
Yes	23	74.2
Warm up before cycling		
No	8	25.8
Yes	23	74.2
Have you ever had an injury while cycling?		
Yes	10	32.3
No	21	67.7
Warm up well and appropriately		
No	10	32.3
Yes	21	67.7
Warming up is very influential in cycling		
No	4	12.9
Yes	27	87.1
Injury		
Injury	10	32.3
No Injuries	21	67.7
Injuries suffered (n=10)		
tingling (PARASTHESIA)	2	20
MUSCLE CRAMPS (LEGS)	3	30
SPrain (SPRAIN)	5	50

Table 5.1 shows that the majority of cyclists in Taman Bungkul Surabaya who were the sample for this research were women with a percentage of 51.6% (16 people). Male cyclists amounted to 48.4% (15 people). Based on age, cyclists in Taman Bungkul Surabaya are dominated by 46-55 year olds with a percentage of 35.5% (11 people), 20-25 year olds are 25.8% (8 people), and 26-35 year olds are 22. 6% (7 people), while the smallest number was aged 36-45 years, amounting to 16.1% (5 people). On average, cyclists in Taman Bungkul Surabaya are 37 years old with the lowest age being 20 years old and the oldest age being 59 years old. The majority of cyclists' education levels in Taman Bungkul Surabaya are high school/vocational school graduates with a percentage of 51.6% (16 people). Other cyclists had junior high school education levels of 12.9% (4 people) and tertiary education levels of 35.5% (11 people).

Of the cyclists who were the sample for this study, there were 74.2% (23 people) who understood warming up and warming up before cycling. Meanwhile, the other 25.8% (8 people) did not understand warming up, so they did not warm up before cycling. Cyclists who had experienced injuries while cycling were 32.3% (10 people). The percentage of cyclists who suffered injuries because they did not warm up properly and appropriately was 32.3% (10 people).

Of the cyclists, 87.1% (27 people) thought that warming up was very influential in cycling. Overall, the number of cyclists who experienced injuries while cycling was 32.2% (10 people) and 67.7% (21 people) did not experience injuries. The injuries most commonly experienced were sprains (Sprain) as much as 50% (5 people), muscle cramps (legs) as much as 30% (3 people), and tingling as much as 20% (2 people).

Table 2 Relationship between warming up and musculoskeletal injuries in cyclists at Taman Bungkul Surabaya

Variable	Injury n (%)		*p*	*Odds Ratio (OR)*
	Yes	**No**		
Understand warm-up				
No	6 (75.0%)	2 (25.0%)	0.003*	14.25 (2.07-98.14)
Yes	4 (17.4%)	19 (82.6%)		
Warm up before cycling				
No	7 (87.5%)	1 (12.5%)	0,000*	46.67 (4.14-525.50)
Yes	3 (13.0%)	20 (87.0%)		
Warm up well and appropriately				

Variable	Injury n (%)		*p*	*Odds Ratio (OR)*
No	9 (90%)	1 (10%)		
Yes	1 (4.8%)	20 (95.2%)	0,000*	180 (10.09-3210.70)
Yes	7 (25.9%)	20 (74.1%)		

Table 5.2 shows that the chi square test results for understanding warm-up (p = 0.003) have p < 0.05, which means there is a significant relationship between understanding warm-up and musculoskeletal injuries in cyclists in Taman Bungkul Surabaya. About 75% of cyclists who don't understand warm-up experience injuries, while 25% of those who don't are injured. This shows that cyclists who understand warming up have a lower risk of injury. The OR value = 14.25 indicates that cyclists who do not understand the warm-up are at 14.25 times higher risk of injury than cyclists who understand the warm-up.

The chi square test results of warming up before cycling (p = 0.000) have p < 0.05, which means there is a significant relationship between warming up before cycling and musculoskeletal injuries in cyclists in Taman Bungkul Surabaya. About 87.5% of cyclists who did not warm up experienced injuries, while only 13% of cyclists who did warm up experienced injuries. This shows that cyclists who warm up before cycling have a lower risk of injury. The OR value = 46.67 shows that cyclists who do not warm up before cycling have a 46.67 times higher risk of injury than cyclists who do warm up.

The chi square test results of warming up well and appropriately (p = 0.000) have p < 0.05, which means there is a significant relationship between warming up well and appropriately and musculoskeletal injuries in cyclists at Taman Bungkul Surabaya. Around 90% of cyclists who do not warm up properly and properly experience injuries, while only 4.8% of cyclists who warm up properly and correctly experience injuries. This shows that cyclists who warm up well and correctly have a lower risk of injury. The OR value = 180 indicates that cyclists who do not warm up well and correctly have a 180 times higher risk of injury than cyclists who warm up well and correctly.

Discussion

Based on the results of statistical tests using chi square, it shows that there is a relationship between the effect of warming up on musculoskeletal injuries in cyclists where the p-value obtained is (< 0.05) which means the value is smaller than the level of significance so there is a relationship between the effect of warming up and musculoskeletal injuries. what happened to cyclists in Taman Bungkul Surabaya. The results of the researchers' analysis show that the effect of warming up also contributes to the incidence of musculoskeletal injuries because the category of cyclists with good warm-up knowledge actually results in fewer injuries than cyclists with less warm-up knowledge. In another study, the same results were obtained, namely that there was a relationship between the effect of warming up on musculoskeletal injuries in students at SDN 01 Tanjung Iman.

In research conducted on 40 students from class IV (four), it was found that the type of injury experienced when carrying out physical education activities was a muscle cramp injury. This research included 10 people out of 40 students or equal to 25% who experienced muscle cramps, calf injuries, knee injuries and hamstring injuries, the factors causing these injuries were lack of warm-up before exercising. (Damayanti, A., 2022).

Warming up before starting sports activities is a series of activities as a stage to prepare the body with light movements. The purpose of warming up is to minimize the risk of injury, maximize performance when exercising, and avoid sports accidents. Data collected from 60 students majoring in Public Health Sciences (IKM) and Sports Training (PKO) at Semarang State University (UNNES), 51 students or 85% answered that it was very important to warm up before sports activities, as many as 8 students or 13.3% answered important, as many as one student or 1.7% answered less important, and there were no students who chose the answer not important to warm up before exercising. One of the reasons someone warms up is to increase blood flow to the muscles which can minimize the possibility of muscle injury. Someone who does not warm up before exercising will be more susceptible to injury. Therefore, before doing exercise, it is important to warm up first to avoid the risk of injury (Agustin, A, et al., 2023)

Previous research also discussed the effect of warming up on musculoskeletal injuries. Data was obtained from athletes from the men's volleyball team at the Institute of Teacher Training and Education (IKIP) of the Indonesian Teachers' Association (PGRI) Bali who experienced sports injuries of around 56%. The most frequently experienced injuries are bruises and sprains with a result of 52%, analysis data states that the cause of sports injuries is most often caused by a lack of warm-up, the result is 58% (Widhiyanti, KT, et al., 2019).

4. CONCLUSION

The results of research conducted generally show that musculoskeletal injuries that occur in cyclists at Taman Bungkul Surabaya are caused by a lack of knowledge and understanding regarding warming up, not warming up before cycling and warming up poorly and inappropriately. Warming up is very influential on our bodies before cycling in order to reduce the risk of musculoskeletal injuries and prepare the body for physical activity, so as a precaution it is recommended to warm up optimally and ensure that the body remains in top condition.

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