



The Effect of Exercise Therapy on Shin Splint Injuries post Half Marathon Running Yogyakarta Running Community

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Abstract. Running sports that are not accompanied by proper warm-ups and cool-downs will result in shin splints. This condition will result in a decrease in the athlete's performance in running competitions. This study aims to evaluate the effectiveness of exercise therapy for shin splint injuries caused after running a half marathon in the Yogyakarta running community. The method used is quasi-experimental using One-Group Pretest-Posttest Design. The exercise program is designed to increase lower limb muscle strength, increase Range Of Motion (ROM), and reduce pain levels. Data were collected using the pretest and posttest methods which were measured using VAS (Visual Analogue Scale) for the pain scale and goniometer for ROM. The population of this study were athletes from the Yogyakarta running community. The results of the study showed that exercise therapy had a significant effect on reducing pain due to shin splints with an average reduction of 1.00 in knee pain and 0.37 in ankle pain. Apart from that, the ROM at the knee and ankle both showed an increase in the degree of ROM.

Keywords: Injury, Running, Shin Splint, Exercise Therapy

1 Introduction

Injuries often occur in the world of sport, especially for long-distance runners. One of the most common injuries experienced is a *shin splint*, which can occur in the front leg muscles. This injury is usually caused by excessive activity when running or incorrect running technique. Runners who take part in half marathons have a higher risk of experiencing this injury. This injury will affect mental health, physical and technical aspects (1).

The consequences of this injury will affect the Range of Motion (ROM) and will cause pain in the shins. ROM is an exercise to measure the range of motion of the joint which can occur actively or passively (with the help of another person) (2). Meanwhile, measurements to assess pain can use the Visual Analogue Scale (VAS). VAS is a simple, fast and effective subjective pain measurement tool consisting of a scale of no pain to a scale of very severe pain (3).

The Yogyakarta running community is a club that is active in various long-distance running sports and often experiences *shin splint injuries* among its members. These injuries not only limit an athlete's performance, but also take a long time to heal if not treated properly (4). Too much running and improper technique are one of the main causes of injury. Considering the importance of maintaining the health and performance

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of athletes, it is necessary to evaluate the effectiveness of strategies for dealing with *shin splint injuries* after the half marathon in the Yogyakarta running community.

Exercise therapy is one way to help treat *shin splint injuries*. This treatment includes a variety of exercises aimed at strengthening leg muscles, increasing flexibility, and speeding injury recovery (5). Exercises such as stretching, strengthening core muscles, and exercises to improve performance. With proper exercise therapy you can speed up the recovery process and reduce the risk of re-injury. Apart from speeding up recovery, exercise therapy also plays an important role in preventing *shin splint injuries*. Exercises that focus on increasing muscle strengthening are important to reduce the risk of pain (6). This allows runners in the Yogyakarta running community to continue taking part in long-distance running sports, especially half marathons, without worrying about *shin splint injuries*.

Various studies have examined that *shin splint injuries* cause 6% -16% of all injuries and can reach 50% of all cases of lower leg injuries. The percentage of possible *shin splints* in men is 44.7% while the probability is 55.3% for women (7). This is also confirmed by research by Fatima et al. (2023) which states that the rate of *shin splint injuries* is 5.9% higher for women (8).

It is hoped that this research will provide great benefits for long-distance runners in Yogyakarta in finding exercise therapy methods to treat and prevent *shin splint injuries*. This research also aims to contribute to the development of better and more effective training programs, improve athlete performance and help reduce the risk of injury. Therefore, researchers are interested in knowing the effect of exercise therapy on *shin splint injuries* after running a half marathon in the Yogyakarta running community.

2 Method

This research uses a quasi-experimental method using *One-Group Pretest-Posttest Design*. Research data was collected using a series of instruments such as questionnaires, *Visual Analog Scale* (VAS) data sheets and goniometers. The population of this study were 16 recreational runners from the Yogyakarta running community. Sampling used a *purposive sampling technique with the criteria of runners experiencing shin splint injuries* who were willing to take part in the research.

Sampling was taken using the *pretest* and *posttest method* with a measurement reference using *the Visual Analog Scale* (VAS) to measure the level of pain during the intervention and a goniometer was used to measure *the Range of Motion* (ROM). The data analysis method used is descriptive analysis which describes the basic characteristics of the data collected and statistical analysis using SPSS software to test the research hypothesis and determine the significance of changes that occur between the pretest and posttest.

3 Result and Dicsussion

3.1 Result

In this research, survey data was collected using pretest and posttest measurements according to the respondent's condition. This measurement includes the level of pain and ROM in both joints before and after exercise therapy.

Table 1. Descriptive Statistics Frequency Pain Scale

	N	Mean	Std. Deviation
Knee Pretest	16	1.50	1,826
Knee Posttest	16	1.00	1,506
Ankle Pretest	16	1.25	1,693
Posttest Ankle	16	0.88	1,500
Valid N (listwise)	16		

From Table 1. the knee and ankle pretest and posttest show a significant effect after exercise therapy. It is known that the mean knee pretest result was 1.50 and the posttest result decreased to 1.00 with a decrease of 0.50. In the pretest ankle, the result was 1.25 and the posttest ankle result decreased to 0.88 with a difference of 0.37. These results indicate that exercise therapy has a significant effect on reducing the degree of pain.

Table 2 . Descriptive Statistics Knee ROM

	N	Mean	Std. Deviation
Flexion Pretest	16	118.4375	11.79248
Flexion Posttest	16	126.2500	8.85061
Extension Pretest	16	6,2500	9.39858
Extension Posttest	16	6,2500	9.39858
Abduction Pretest	16	49,0000	11.13553
Abduction Posttest	16	49,0000	11.13553
Adduction Pretest	16	38.3750	8.62458
Adduction Posttest	16	46,0000	6.14275
Valid N (listwise)	16		

In Table 1, the knee pretest and posttest show a significant increase in the flexion and adduction variables, both from the average value and the Std number. Deviation. Meanwhile, the extension and abduction variables had a smaller increase. From the

research results in Table 1, it can be seen that exercise can increase the Range of Motion (ROM).

Table 3 . Descriptive Statistics Ankle ROM

	N	Mean	Std. Deviation
Dorsiflexion Pretest	16	21.8750	9.81071
Dorsiflexion Posttest	16	24.6875	6.94472
Plantarflexion Pretest	16	40.9375	14.04976
Plantarflexion Posttest	16	40.9375	14.04976
Inversion Pretest	16	35.3750	8.76261
Inversion Posttest	16	38,0000	6.14275
Eversion Pretest	16	32.0625	14.22893
Eversion Posttest	16	36.5625	10.28247
Valid N (listwise)	16		

From Table 2. The pretest and posttest ankle show significant results after the intervention. Overall, there was a significant increase in the variables, pretest flexion was 21.8750 and increased to 24.6875 with a difference of 2.8125. In the extension pretest, the figure was 40.9375. The pretest inversion was 35.3750 and increased to 38.000 with a difference of 2.625. In the pretest, eversion was 32.0625 and increased to 36.3625 with a difference of 4.500. From Table 2, it can be seen that training therapy has a significant effect on increasing the Range of Motion.

3.2 Discussion

Shin splints are caused by persistent tension in the connective tissue that connects muscles to bones and ligaments. This condition is usually caused by a sudden increase in the duration and intensity of physical activity, such as running longer distances than before. There are many symptoms of complications, including sharp pain and tenderness along the shin bone, burning sensation, and swelling in the area and continuing to cause a fracture (9) . This condition can also make muscles, tendons, ligaments, joints or bones unable to work properly. These symptoms reduce comfort while running and can also reduce the ability to exercise and carry out daily activities. *Shin splint* involves placing the foot in plantar flexion with gentle pressure on the soft tissue in front of the radial bone (9) . According to Deshmukh (2022), to overcome this condition, strengthening the anterior tibialis muscle is very important and can be done with strengthening exercises that do not cause pain. One of the main causes of *shin splint* pain is excessive tension in the calf muscles. This repetitive and excessive movement can cause pain in the posteromedial or anteromedial area of the leg and tense the gastrocnemius muscle. One of the appropriate treatments is exercise therapy which can help relieve symptoms and prevent recurrence of *shin splints*.

Exercise therapy is an effective way to treat back pain. By combining proper stretching techniques and exercises that increase the strength of the underlying muscles, this treatment can reduce the intensity and frequency of pain in this condition. Exercises such as grip and balance training therapy have been shown to reduce pain (10). In this condition, sufferers will feel a decrease in muscle tension that causes *shin splints*.

Exercise therapy can also reduce the risk of *shin splint* injuries by increasing strength and endurance. Increases strength in the core muscles of the legs, such as the calf muscles and anterior tibia. This will help reduce the load on the bones and soft tissues. Exercise therapy starting with light to moderate intensity will not only reduce symptoms, but also prevent *shin splints* from returning or getting worse. Exercise therapy will improve the quality of life and long-term health of sufferers of this condition.

In this study, an exercise therapy program was used with movement designs such as *calf raises, walking calf raises, one leg calf raises, squads, sumo squads, lunges, walking lunges, and side lunges*. This program focuses on increasing the strength and endurance of the *quadriceps, posterior tibialis, and gastrocnemius muscles*. The application of exercise therapy in this study had 16 meetings with each 4 meetings having its own level of intensity depending on the patient's condition. The first meeting starts with light intensity and increases as the Range Of Motion (ROM) increases.

4 Conclusion

Based on this research, the results of the exercise therapy treatment test on *shin splints* showed a significant effect. Exercise therapy has been proven to reduce the scale of pain experienced by *shin splint* sufferers. The exercise therapy program carried out in stages had a significant effect with an average reduction in knee pain scale of 1.00 and an average reduction in ankle pain scale of 0.37. This also has an effect on increasing the Range of Motion (ROM) in the knees and ankles.

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