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Manual Therapy for Runner's Injuries: A Review Study

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Abstract

Background: Injuries are a common problem among runners. Physiotherapists work with runners to assess body biomechanics, muscle strength, and flexibility, and develop rehabilitation programs tailored to individual needs. Manual therapy, strengthening exercises, and neuromuscular techniques are some of the interventions often used to address dysfunction and improve impaired movement patterns. Purpose: The purpose of this study is to provide information on manual therapy techniques and the value they have on runner's injuries. Method: This study used the narrative review method to evaluate the application of manual therapy in the management of runners' injuries. The narrative review method was chosen because there are still very few research results on the topic of manual therapy in runners' injuries. Results: From all the studies that can be collected, it states that manual therapy can be applied to runner's injuries in acute to chronic conditions. The application of manual therapy interventions was various, ranging from joint and soft tissue mobilization, stretching, manipulation and muscle energy techniques. Manual therapy interventions including dry needling or instrument assisted soft tissue mobilization (IASTM) can help the rehabilitation process in runner injuries. Conclusions: Manual therapy can be utilized in the early phase of rehabilitation of runner's injuries, both in acute and sub-acute conditions. The application of manual therapy techniques is tailored to the specific needs of each runner's injury condition. The use of manual therapy is highly recommended and has a beneficial effect when combined with exercise therapy.

Keywords: Runner, Injury, Manual Therapy, Sports, Rehabilitation, Physiotherapy.

INTRODUCTION

Injuries are a common problem encountered by both long and short distance runners [1]. Previous research indicates that approximately 19-79% of runners will experience a running-related injury each year [2]. In addition, most injuries experienced by runners are lower extremity injuries [3]. Knee injuries, such as patellofemoral pain syndrome (PFPS) or "runner's knee," are the most commonly reported type of injury in runners [4]. In addition, injuries to the lower limbs, such as shin splints and plantar fasciitis, are also very common. Injuries in runners tend to be higher in those who are just starting out or who drastically increase the intensity or distance of running [5]. Longitudinal studies have shown that runners with a previous history of injury are more vulnerable to re-injury, with up to twice the risk of runners with no history of injury [6]. In addition, factors such as poor body biomechanics, use of inappropriate shoes, and lack of variety in training patterns also contribute to the high incidence of injury among runners [2].

Injury prevention in runners involves several approaches, including adequate warm-up, core strengthening, and progressive training [7]. The use of footwear that is appropriately suitable for the foot type and running pattern is also important to reduce the risk of injury. Physiotherapists with their various interventions play a part to address injuries that have already occurred, with the aim of accelerating recovery and preventing re-injury. Physiotherapy has an important role to play in the management of injuries in runners, with a focus on recovery, prevention of re-injury, and optimizing athlete performance [8].

Sports physiotherapists have four basic competencies in practice which are described in the eleven competencies of the International Federation of Sports Physical Therapist [9]. The four competencies are injury prevention, acute intervention, rehabilitation, and performance enhancement. Previous research has shown that a multidisciplinary approach involving physiotherapy can accelerate the recovery process and improve long-term outcomes in runner's injuries [10]. Physiotherapists can work with the runner to assess body biomechanics, muscle strength, and flexibility, and develop a rehabilitation program tailored to individual needs. Manual therapy, strengthening exercises, and neuromuscular techniques are some of the interventions often used to address dysfunction and improve impaired movement patterns [11].

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Manual therapy techniques such as joint mobilization, manipulation, and soft tissue mobilization, have become an important component of injury management in runners. Research has shown that manual therapy can help reduce pain, increase range of motion, and speed up the recovery process after injury [12]. Manual therapy primarily works by reducing tension in the muscles and soft tissues, as well as increasing blood circulation to the injured area, which is essential for healing [13]. In runners with injuries such as patellofemoral pain syndrome or plantar fasciitis, manual therapy is often used to address soft tissue dysfunction and help restore normal biomechanics [14]. In addition, manual therapy can also contribute to improving neuromuscular function, which is essential for the prevention of repetitive injuries. Research shows that the combination of manual therapy with strengthening and stretching exercises can provide better results compared to a single intervention [15]. The purpose of this study was to find and provide information about manual therapy techniques and the effects they can have on runner's injuries. The application of manual therapy to injuries in the sport of runners is still little presented in current research. The results of this study will provide a concise guide for physiotherapists in the use of manual therapy in the management of runner injuries.

METHODOLOGY

This study used the narrative review method to evaluate the application of manual therapy in the management of runners' injuries. The narrative review method was chosen because there are still very few studies on the topic of manual therapy in runner's injuries. The search results and analysis of current literature focused on manual therapy for common runners' injuries. The literature search utilized electronic databases such as PubMed, Scopus, and Google Scholar using the keywords “manual therapy,” “running injuries,” and “running injuries”. The keyword “running injuries” was used to match the findings of the most common injuries experienced by runners. Inclusion criteria included peer-reviewed articles and clinical guidelines that focused on manual therapy as an intervention for running injuries. As for the use of manual therapy, only systematic review articles and clinical practice guidelines related to running injuries with a publication range from 2020-2023 were reviewed. Articles that were not published in English or that lacked empirical data were excluded from this review. The findings of this review were summarized to provide an overview of the effectiveness of manual therapy, current trends, and best practices in runners' injury rehabilitation. This narrative review method provides a clear summary of the application of manual therapy for runners' injuries, as well as reliable references to support the findings and recommendations of the review.

RESULTS

Common runner's injuries

A literature study by Arnold & Moody, outlined some common running injuries [3]. They conducted a review of runner injuries in the American population. From this previous study, it was also presented that the prevalence of runner injuries was predominantly in the knee followed by foot and ankle, hamstring muscles and in the tibia region. The prevalence was obtained from the results of a meta-analysis. In addition, based on a summary of previous research, they also mentioned injuries with specific pathologies experienced by runners such as patellar tendinopathy, patellofemoral pain syndrome, ankle sprains, Achilles tendinopathy, plantar fasciitis, hamstring muscle injury and tendinopathy, medial tibial stress syndrome and tibial stress fracture.

In previous research with a systematic review conducted by Kakouris et al., provided information about musculoskeletal injuries in runners [4]. In the study, the data presented from an exploratory study were ultramarathon and non-ultramarathon runners. In general, it is stated that runners experienced many injuries in the lower extremity region with the most knee and foot and ankle areas. In non-ultramarathon runners, it was found that most injuries were found in the knee region both in prevalence and incidence. Whereas, in marathon runners, more occurred in the ankle region, followed by the knee and lower leg. The related pathology of the injuries was also explained in the study. In the researchers' review, it was found that patellofemoral pain syndrome (PFPS) was one of the most common injuries in general, followed by medial tibial stress syndrome and stress fracture.

However, in non-ultramarathoners, the most common incidence was Achilles tendinopathy and anterior compartment tendinopathy in ultramarathoners. In ultramarathoners, the most common injury was patellofemoral pain syndrome. Furthermore, the frequency of non-ultramarathoner had Achilles tendinopathy and plantar fasciitis, while in marathoners it was patellofemoral pain syndrome, followed by anterior compartment tendinopathy and Achilles tendinopathy.

Research by Zhao et al., stated almost the same results in their search for running injuries [16]. In their study they used a survey method on ordinary or non-competitive runners with a total of 256 participants. The most injured body region was the lower extremity (62.89%) with the knee, foot and ankle regions being the most common. However, in their study they only described the body parts that were injured.

Another study by Fredette et al., with a systematic review method also had similar results [5]. The results of the researcher's review presented data on runners in categories of novice, recreational, competitive, and mixed level runners. In novice and recreational runners, most injuries were found in the knee and lower leg. Meanwhile, competitive, and mixed level runners had more injuries to the foot/ankle region, followed by the knee and lower leg. In general, it remains to be stated that knee injuries are the most common among runners, followed by foot/ankle injuries and lower leg injuries. However, this previous study did not explain the specific pathology that occurred in the runners.

It can be summarized that lower extremity injuries are the most common among runners. In addition, injuries specifically occur in the knee, foot/ankle, and lower leg. In specific pathology, the most common injuries are patellofemoral pain syndrome, iliotibial band syndrome, medial tibia stress syndrome, plantar fasciitis, ankle sprain, Achilles tendinopathy and anterior compartment tendinopathy [4]. However, the causes of injuries are multifactorial such as experience, training, distance, duration, frequency and intensity of running [5]. The summary of runner’s injuries is presented in table 1.

Table 1: Common Runner's Injuries profile summary

Common site of injury	Common specific pathology
Knee	Patellofemoral pain syndrome
Foot and Ankle	Iliotibial band syndrome
Lower Leg	Medial tibia stress syndrome
	Plantar fasciitis
	Ankle sprain
	Achilles tendinopathy
	Anterior compartment tendinopathy

General practice of manual therapy in sports rehabilitation

In physiotherapy practice, especially in the management of sports injuries, physiotherapists need to consider the stages of injury rehabilitation. Research by Anggiat, states several phases in the treatment of sports injuries that can be a general guide (Table 2) [8].

Table 2: Sports Rehabilitation Phase (Simplified)

Phase	Aim	Type of Intervention (Example)
Phase I	Control inflammation and Pain	PRICE (Protect, Restrict activity, Ice, Compression, and Elevation). Electro physical modalities Manual Therapy Therapeutic Exercise
Phase II	Restoring Range of Motion (Flexibility)	Electro physical modalities (If needed) Manual Therapy Therapeutic Exercise
Phase III	Increase muscle strength, endurance, agility, etc.	Muscle strengthening exercises with progressive weights on the injured part. Flexibility training Endurance Training
Phase IV	Return to Sports/ Physical Activity	Continue flexibility and strengthening Advanced agility/speeds/power training such as plyometric Return to Sport Testing

The first and second phases are important for the progression of the physiotherapy program for patients with sports injuries. The first and second phases are also common treatments for musculoskeletal injuries. The focus in the first phase is the control of inflammation and pain that appears in the injured area. The use of modalities such as electro therapy, PRICE (Protect, Restrict activity, Ice, Compression, and Elevation), manual therapy and exercise therapy. In the second phase, it continues with increasing the range of motion of the injured joints or flexibility. In the second stage, the same interventions as the first phase can still be continued, such as electro therapy and manual therapy, but exercise therapy will be more dominant in increasing the scope of joint motion. From these guidelines, it can be conveyed that manual therapy can be given in the early phases of injury management, namely phase one to phase two with a focus on reducing pain and increasing range of motion of the joint. Previous research also stated that manual therapy techniques can provide beneficial effects on musculoskeletal disorders [17]. Manual therapy, in its application, has several types aimed at the part of the body that is impaired [18,19]. The table 3 describes several types of manual therapy with their objectives and basic techniques.

Table 3: Manual therapy techniques [18]

Objective	Type of manual therapy	Basic techniques
Joint	Manipulation	Passive motion technique greater than normal joint range of motion/physiological motion
	Mobilization	Passive joint mobilization techniques or combined active movements
	Muscle Energy Techniques	Active assisted techniques on muscles up to or above normal limits of motion
Soft Tissue	Myofascial	Deep pressure technique to increase soft tissue flexibility and range of motion
	Muscular	Deep pressure technique to improve muscle performance
	Lymphatic	Light pressure technique, superficial to improve lymphatic circulation
Nerve	Neurodynamic	Passive/active movement techniques for nerve elongation/glide with movement and posture

From the data describing the manual therapy techniques above, it can be seen that manual therapy does not always use passive techniques, but also various methods using active movements [20]. In fact, manual therapy techniques also combine muscle contractions, not only movements in the joints or soft tissues. Furthermore, manual therapy or internationally known as orthopaedic manual physical therapy is a specialization of physiotherapy practice that focuses on neuromusculoskeletal management with manual techniques and exercise therapy based on clinical decision making [21]. This further indicates that manual therapy is not only limited to manual technique interventions but also exercise therapy.

Practice of manual therapy for runner's injuries

Regarding specific pathologies, several review studies and clinical practice guidelines also provide guidance and recommendations for manual therapy that can be used by physiotherapists in the management of runners' injuries. The following are the results of a review of several sources.

Manual therapy for Patellofemoral Pain Syndrome (PFPS)

A study in 2020 by Racoosin et al., which discussed the clinical decision making of using manual therapy interventions as part of the integration of interventions in patellofemoral pain syndrome (PFPS) conditions stated that manual therapy can be a helpful intervention tool [22]. Manual therapy will have the effect of reducing pain and improving function in patients with PFPS. The study also stated that manual therapy techniques such as soft tissue and joint mobilization/manipulation can be used in PFPS conditions. However, the use of manual therapy is not used as a stand-alone intervention, but rather an integrated therapy with other therapies.

In the same year, a meta-analysis study by Winters et al. examined the comparative effectiveness of interventions for PFPS conditions [23]. In their study, they stated that combination intervention is quite effective in handling PFPS. The combination intervention in question is education with physical treatments such as exercise therapy and manual therapy.

Subsequently, in the following year, a quite comprehensive study was conducted by Wallis et al. who reviewed clinical practice guidelines related to the role of physiotherapy in the management of PFPS conditions [24]. In the results of the research review, it is also recommended that physiotherapists use integrated combination interventions such as exercise therapy, patellar taping, patient education as well as manual therapy. Manual therapy is not recommended as a stand-alone treatment. Furthermore, in a study by Neal et al., which also investigated six interventions for PFPS conditions [25]. In their study, they also suggested that combination interventions are relatively effective in treating PFPS for about three months. Additionally, manual therapy interventions such as lower-quadrant manual therapy were also recommended, along with exercise therapy. Subsequently, research by Walli et al., who conducted a review study on diagnosis and treatment for PFPS conditions stated several recommended intervention suggestions [26]. Their recommendations reiterate that combination interventions are excellent as a treatment for PFPS conditions. Manual therapy intervention can be utilized as an adjunct treatment of a combination of other interventions. However, it was also mentioned in the study that the manual therapy interventions discussed were only soft tissue techniques. This is due to the limited data obtained by the researchers. Furthermore, the most recent systematic review meta-analysis study by Lin et al., explained that lumbopelvic manipulation can be an adjunctive intervention in reducing pain in PFPS patients [27]. This study is quite unique because the lumbopelvic manipulation technique is not directly on the patellofemoral region therefore the lumbopelvic manipulation intervention is given in enhancement to the main intervention of PFPS.

In general, all studies still recommend the use of manual therapy both joint mobilization/manipulation and soft tissue techniques for PFPS conditions, although it must be used in combination with other interventions. In fact, lumbopelvic manipulation intervention can help reduce PFPS pain as an adjunctive therapy.

Manual therapy for Iliotibial Band Syndrome (ITBS)

Research on the application of manual therapy specifically to the condition of iliotibial band syndrome (ITBS) is not available, so the results of the research obtained are more general physiotherapy management. A previous study by Miccio et al., related to a review of conservative rehabilitation treatment for ITBS conditions [28]. In the review, many studies were reviewed, one of which was about manual therapy. Manual therapy has a role in handling the sub-acute phase in the context of reducing pain and increasing ROM and functional indexes. Some manual therapy techniques obtained from the results of the review such as joint mobilization, high velocity low amplitude, mobilization with movement, muscle energy techniques as well as soft tissue mobilization. However, many studies on manual therapy are still in the experimental stage and are combined with exercise therapy.

Furthermore, Sofia et al., conducted a review study related to the effects of physiotherapy approaches on ITBS conditions [29]. Using the systematic review model, they found several studies that used manual therapy in the management of ITBS conditions. Manual techniques such as soft tissue mobilization and self-stretching were widely opted for in previous experimental studies with significant results compared to other interventions. Manual therapy was found to reduce pain and decrease impairment based on specific examinations.

Furthermore, a recent study by Bonoan et al., which compiled current evidence related to ITBS gave the results of his research that exercise therapy interventions were more recommended than only manual therapy [30]. However, in their review, exercise therapy combined with deep soft tissue mobilization can have a good effect in decreasing pain and increasing joint range of motion. Based on the three previous studies, manual therapy will have a very good effect if combined with exercise therapy. In combination with the intervention, the symptoms of ITBS injury such as pain will be reduced and there will be an increase in the scope of joint motion.

Manual therapy for Medial Tibia Stress Syndrome (MTBS)

In the condition of Medial Tibial Stress Syndrome (MTBS) there is only one review study that analyzes the examination to interventions that can be used. Deshmukh & Phansopkar, explained from the results of their review study related to MTBS from the definition, location, pathology, risk factors, incidence, examination to treatment used [31]. In the treatment section, they explain some of the manual therapy options that can be used such as soft tissue mobilization and stretching. Manual therapy is recommended for pain reduction and increased flexibility. However, using it in conjunction with exercise therapy will increase its effectiveness.

Manual therapy for Plantar Fasciitis

In 2020, a review study related to the evaluation and treatment of chronic plantar faciitis [32]. was explained in their study that manual therapy can be used as an adjunctive therapy to exercise therapy and stretching. Types of manual therapy that can be used such as joint and soft tissue mobilization to help increase lower extremity flexibility, reduce pain and improve function. Followed by a systematic review study by Rhim et al., several manual therapy techniques were often used for plantar fasciitis conditions [33]. Manual techniques such as dry needling, stretching, instrument assisted or manual soft tissue mobilization, joint mobilization/manipulation generally resulted in decreased pain and improved function. However, exercise therapy and combining with manual therapy still provided superior results.

Furthermore, research by Chhabra & Bir Singh, which reported a review study with relatively similar results [34]. They recommended the use of manual therapy such as joint and soft tissue mobilization in combination with other therapies or stand-alone therapy. In 2023, the American Physical Therapy Association issued clinical practice guidelines in terms of plantar fasciitis, also known as plantar heel pain [35]. Manual therapy such as joint and soft tissue mobilization is recommended as an effective intervention in terms of decreased pain, increased joint range of motion and improved function. Their recommendation is based on the strong evidence classification.

Manual therapy for Ankle Sprain

A clinical practice guideline on impaired ankle stability and coordination of movement due to lateral ankle ligament sprain provides several recommendations for interventions related to lateral ankle ligament sprain [36]. Manual therapy was one of the recommended interventions with strong evidence. In acute and subacute conditions, physiotherapists can provide manual therapy such as lymphatic drainage, active and passive soft tissue and joint mobilization which of course is given alongside therapeutic exercise. Through manual therapy in acute conditions, there will be a reduction in swelling, pain and improvement in walking parameters. In chronic conditions, manual therapy is also highly recommended such as graded joint mobilization, manipulation and non-weight bearing and weight bearing mobilization with movement. Manual therapy in chronic conditions will help to improve joint range of motion in the short term.

In line with clinical practice guidelines, a systematic review study investigated the effects of manual therapy and exercise in patients with lateral ankle sprain [37]. From the results of the study, manual therapy was recommended along with exercise therapy to improve the clinical outcome of patients with lateral ankle sprain such as decreasing pain, increasing function, joint range of motion. Compared to exercise alone, manual therapy with exercise has a more beneficial effect. The recommended types of manual therapy are joint mobilization on limited joints and graded mobilization, including joint manipulation of the talocrural joint.

Furthermore, a systematic review of clinical practice guidelines on ankle sprain conditions also concluded the similar result [38]. In their study, they stated that manual therapy is highly recommended from three clinical practice guidelines. Manual therapy helps reduce pain and edema in the short and long term and accelerate the recovery process.

Manual therapy for Achilles tendinopathy

In regard to Achilles tendinopathy, a review study by Von Rickenbach et al., provide information related to evaluation, rehabilitation and prevention recommendations [39]. One of the rehabilitation techniques reviewed was manual therapy. According to their review, manual therapy with a joint and soft tissue mobilization approach can be used as adjunctive therapy for Achilles tendinopathy. The purpose of manual therapy is generally for symptom modulation. In addition, manual therapy was low cost and low risk intervention used on an individualized basis.

In 2022, Malliaras also conducted a review study related to physiotherapy management of Achilles tendinopathy conditions [40]. The results showed that manual therapy can be given as an adjunct therapy to improve recovery along with exercise therapy.

The results showed that manual therapy can be given as an adjunct therapy to improve recovery along with exercise therapy [41]. In the discussion, manual therapy techniques in Achilles tendinopathy conditions are very diverse such as ankle joint mobilization including subtalar joint, talocrural thrust manipulation, hip joint mobilization and deep friction massage. Manual therapy is considered a safe and effective intervention in decreasing pain, increasing ankle ROM, and even in increasing plantar muscle endurance.

Manual therapy for Anterior Compartment Tendinopathy (ACT)

Research on anterior compartment tendinopathy is not widely available. One of the available ones is research by Velasco & Leggit, with the form of a literature study [42]. Anterior compartment tendinopathy or also known as Chronic Exertional Compartment Syndrome is mostly treated with conservative methods by medical and surgical treatment. In physiotherapy, manual therapy techniques such as deep tissue massage, stretching, dry needling was beneficial in reducing symptoms followed by exercise. Exercise therapy was also found to be superior in ACT recovery.

DISCUSSION

From all the studies summarized, it was clear that manual therapy can indeed be applied to runners' injuries. Manual therapy generally benefits the rehabilitation of acute, subacute and even chronic injuries [36]. The practice of manual therapy interventions is varied, which include joint and soft tissue mobilization, stretching, manipulation and muscle energy techniques. Manual therapy interventions using tools such as dry needling or instrument assisted soft tissue mobilization (IASTM) can also be useful in the rehabilitation process of runner's injuries.

Generally, the use of manual therapy should emphasize clinical reasoning [43]. The effects of manual therapy mainly include pain reduction, increased range of motion (ROM), and improved functional ability [44,45]. The effect of manual therapy will be more optimized if it is integrated with exercise therapy [37]. Regarding the variety of techniques, physiotherapists do not need to rely on specific techniques. Manual therapy can be a safe and effective intervention if used in accordance with the needs and will increase confidence for athletes to return to their sport [12]. Various manual therapy approaches still provide good effects and none are superior to the others, so it is necessary to have a deep understanding of the manual techniques mastered by physiotherapists [17].

Study limitations

In the present study, detailed manual therapy techniques for specific pathological conditions were not described due to limited information from the sources. This present study is a narrative review; therefore, a systematic review meta-analysis may be conducted in the future to support the latest evidence.

CONCLUSION

Manual therapy can be utilized in the early phase of rehabilitation of runner's injuries, both in acute and sub-acute conditions. The application of manual therapy techniques is tailored to the specific needs of each runner's injury condition. The use of manual therapy is highly recommended and has a beneficial effect when combined with exercise therapy.

Recommendations

Physiotherapists can use the results of this study in the practice of manual therapy for runners' injuries. However, the manual therapy techniques that are recommended are still based on clinical reasoning and should be combined with exercise therapy.

Conflicts of interest

None declared.

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