

Complete Weight Bearing Versus Partial Weight Bearing in Management of Acute Ankle Sprain

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ABSTRACT

Background and purpose: Acute lateral ankle ligament injuries (ankle sprains) are common problems in acute medical care. The treatment variation observed for the acutely injured lateral ankle ligament complex suggests a lack of evidence-based management strategies for this problem. **Subjects and methods:** The study included forty patients, age ranged from 18 to 25 year and divided into two groups. The first group with mean age 21.4 ± 2.65 years followed a physical therapy program of exercises in the form of strengthening exercises for dorsiflexors, planterflexors, evertors, and invertors muscles, stretching exercise of planterflexors, using of ankle support (elastic bandage), and partial weight bearing, three sessions per week for 3 weeks. The second group with mean age 22.1 ± 3.21 years, submitted to a physical therapy program of exercises in the form of strengthening exercises for dorsiflexors, planterflexors, evertors, and invertors muscles, stretching exercise of planterflexors, using of ankle support (elastic bandage), and complete weight bearing, three sessions per week for 3 weeks. Outcome measures were rating score system of the japanese orthopaedic association for measuring daily living activities (walking), universal goniometer to detect range of motion of ankle dorsiflexion and planterflexion, and visual analogue scale to measure the pain severity. **Results:** There was a significant difference in the first group (t of pain=0.0007, t of ROM of dorsiflexion=0.009, t of ROM of planterflexion=0.007, t of ADL (walking) =0.035) than in the second group, there was a significant difference (t of pain=0.0009, t of ROM of dorsiflexion=0.007, t of ROM of planterflexion=0.0008, t of ADL (walking)=0.025). In comparison, there was a significant difference in ADL (walking) only. **Discussion and Conclusion:** This study showed that patients rehabilitated according to the complete weight bearing is better than partial weight bearing in pain and ROM, and specially ADL (walking) in management of ankle sprain patients.

Key words: Lateral ankle sprain, ankle pain, inversion ankle injury.

INTRODUCTION

Ankle sprains are the most common sports injuries encountered today. These injuries occur frequently. Complications of prolonged ankle pain, a high recurrence rate, and chronic ankle

laxity underline the importance of careful diagnosis and treatment of ankle sprains. A large percentage of musculoskeletal injuries observed in the outpatient setting involve the ankle. Sprains constitute 85% of all ankle injuries. Of these, 85% are inversion sprains. Up to one sixth of participation time lost from

sports results from ankle sprains. Proper rehabilitation begins with accurate diagnosis because up to 40% of patients with untreated or misdiagnosed ankle injuries develop chronic symptoms^{2,5}.

Ankle sprains result from force around the ankle that exceeds the tensile limits of the supportive ligaments of the ankle mortice but is less than that which would break the ankle bones. Because the ankle joint is the dynamic link between the leg above and the foot planted on the earth below, it is the site of concentrated forces^{10,14}.

Mechanical force exceeding the tensile limits of the ankle joint capsule and supportive ligaments causes ankle sprains. A number of contributing factors exist. These can be classified as predisposing and provocative factors. Predisposing factors can include poor muscle tone or proprioceptive sense and shortened and/or contracted joint capsule or tendons from lack of conditioning. Inadequate training or experience with the physical activity being performed can also predispose to injury. Provocative factors include accidents and other unforeseen circumstances that result in mechanical stress exceeding the tensile limits of the ankle joint capsule and ligaments. Obesity contributing to increase of body weight and kinetic energy in excess of joint design stress limits can contribute to sprains^{11,16}.

Ankle sprains commonly are classified into the following 3 grades. Grade I sprains have a mild degree of swelling, and stretch has occurred to the ligamentous structures. Weight bearing is possible. Grade II sprains have a moderate degree of swelling and an incomplete tearing of ligamentous structures. Mild instability may be present, but a definite end point is present on ligamentous testing. Pain may be noted with weight bearing. Grade III sprains have severe swelling and are

defined by at least 1 ligamentous structure being ruptured completely. Evidence of instability may be noted^{3,12}.

History of an ankle sprain is usually of an inversion-type twist of the foot followed by pain and swelling. An individual with an ankle sprain can almost always walk on the foot carefully with pain. The ability to walk on the foot usually excludes a fracture and indicates that a sprain has been experienced in an individual with normal local sensation and cerebral function. A person with a third-degree ankle sprain often provides a history of an audible snap followed by pain and swelling¹⁷.

The physical examination is performed to confirm the diagnosis made based on history and to differentiate an ankle sprain from a fracture. A sprain is usually well defined by pain over the ligament that is sprained. Ankle motion is painful, and the ankle appears to be in the normal anatomic position. The skin is usually intact with local swelling and bruising in third-degree ankle sprains. A positive anterior drawer sign finding on the injured ankle is evidence of anterior talofibular ankle ligament rupture^{20,23,25}.

Following the acute injury, the physical therapist may provide therapeutic modalities (eg, cryotherapy, electrical muscle stimulation) to speed the reduction of pain and swelling. As the patient progresses and is able to tolerate further therapy, the goals should be aimed at regaining full range of motion (ROM), strength, and stability of the ankle joint. The physical therapist also completes patient education throughout the rehabilitation process and establishes an appropriate home exercise program for each individual patient. The goal of the program should be to enable the patient to return to his/her previous level of activity. For less severe injuries, immediate protected ambulation should be encouraged, and

physical therapy should emphasize return of ROM, strength, endurance, and proprioception^{6,22,26}.

Most ankle sprains (Grade I and II) heal spontaneously with immediate ice applied locally, elevation for the first 24 hours after injury, the use of an ankle support as long as symptoms persist, and avoidance of activity that hurts. Many immobilization devices are comfortable and conform to the ankle with air cushion pads (eg, air cast). Immobilization that allows movement until healing has taken place (3-6 weeks) is the criterion standard for ankle sprain treatment because the collagen fibers heal the fastest and orientate along the lines of force where protected movement occurs. Early movement also helps in decreasing swelling and the danger of fibrosis that normally develops in chronic swelling. After the immediate swelling has subsided for acute third-degree ankle sprains, cast immobilization is indicated for 3 weeks followed by a walking boot or other ankle immobilization device. The physiologic rationale for immediate ice and elevation is to decrease the swelling and reduce the danger of long-term postswelling fibrosis^{8,9,21}.

Treatment goals during the acute phase of injury are to minimize swelling and allow the patient to begin walking. The acute phase of treatment should last 1-3 days following the injury. A combination of protection, relative rest, ice, compression, elevation, and support is used. The treatment of second-degree sprains are rest, ice, elevation, and compression dressing or commercially available air stirrup splint. Stirrup splints may result in better outcomes, consider initial cessation of weight bearing, early range of motion exercises, and consider referral to physical therapy for early range of motion exercise and wobble board training after recovery to reduce the number of

recurrent injuries and to prevent functional instability^{7,8,15}.

The second indications for surgical treatment of acute ankle sprains that are generally agreed upon are (1) deltoid sprain with the deltoid ligament caught intraarticularly widening the medial ankle mortice and (2) inferior tibiofibular syndesmosis sprain causing real or potential widening of the ankle mortice. Acute grade 3 tears of the interior tibiofibular ligament can occur with a normal radiographic appearance on images in which the patient is not bearing weight, which is the standard of care in acute ankle sprains because of the discomfort associated with bearing weight. Thus, keep in mind that normal radiographic findings may be compatible with the need for surgery^{18,19}.

The aim of the current study is to compare between complete weight bearing and partial weight bearing in management of acute ankle sprain.

MATERIALS AND METHODS

Subjects

All subjects were grade II of ankle sprain. The study included 40 (24 females and 16 males) volunteer patients, age ranged from 18 to 25 years and divided into 2 groups. The first group with mean age 21.4 ± 2.65 years followed a physical therapy program of exercises in the form of strengthening exercises for dorsiflexors, planterflexors, evertors, and invertors muscles, stretching exercise of planterflexors, using of ankle support (elastic bandage), and partial weight bearing, three sessions per week for 3 weeks. The second group with mean age 22.1 ± 3.21 years, submitted to a physical therapy program of exercises in the form of strengthening exercises for dorsiflexors, planterflexors, evertors, and invertors muscles, stretching

exercise of planterflexors, using of ankle support (elastic bandage), and complete weight bearing, three sessions per week for 3 weeks. All the patients were listed at out clinic at Cairo University hospitals. All of them were suffering from pain, swelling, and limitation of ROM of ankle joint.

Instrumentations

- 1- Rating score system of Japanese Orthopaedic Association is to measure daily living activities, walking.
- 2- Universal goniometer is to detect range of motion (ROM) of ankle dorsiflexion, and planterflexion.
- 3- Visual analogue scale (VAS) is to measure the pain severity.

Procedures

The patients signed an informed consent form, and were informed about the whole procedures before testing and training:

Treatment procedures:

Both groups were instructed to avoid weight bearing for first three days. The first group was submitted to physical therapy program which was in the form of strengthening exercises of dorsiflexion (from supine lying position and ask the patient to move the foot towards the body with moderate resistance, 10 repetitions with 3 sets, 6 seconds rest between each repetition, and 1 minute rest between the sets). Strengthening exercises of planterflexion (from supine lying position and ask the patient to move the foot away from the body with moderate resistance, 10 repetitions with 3 sets, 6 seconds rest between each repetition, and 1 minute rest between the sets). Strengthening exercises of eversion (from sitting position and ask the patient to rotate the foot outward the body with moderate resistance, 10 repetitions with 3 sets, 6 seconds rest between each repetition, and 1 minute rest

between the sets). Strengthening exercises of inversion (from sitting position and ask the patient to rotate the foot inward the body with moderate resistance, 10 repetitions with 3 sets, 6 seconds rest between each repetition, and 1 minute rest between the sets), stretching exercise for planterflexors (from long sitting with one hand fixing the knee and the other hand stretches the planterflexor muscles, 5 repetitions, 30 seconds in position of stretching, 30 seconds in position of relaxation) with using of ankle support (elastic bandage) and using a cane from the fourth day on the opposite side to transfer some of weight from the affected side during walking (partial weight bearing). The program continued for 3 weeks, 3 sessions per week performed and supervised by the same physical therapist.

The second group was submitted to the same physical therapy program of the first group but with complete weight bearing during walking from the fourth day. The program continued for 3 weeks, 3 sessions per week performed and supervised by the same physical therapist.

Assessment procedures:

All the patients were assessed before treatment and reassessed after 3 weeks by:

- 1- Rating score system of Japanese Orthopaedic Association is to measure daily living activities, walking, which is measured by 4 grades which are no restriction, mild restriction, moderate restriction and severe restriction.
- 2- Universal goniometer is to detect range of motion (ROM) of ankle dorsiflexion and planterflexion. Patients was sitting on bed with extended of the lower limb. The fixed arm of the goniometer is placed in parallel to the tibia and the movable arm in parallel to the foot then the subjects were asked to

dorsiflex and planterflex and record the angle of dorsiflexion and planterflexion.

- 3- Visual analogue scale (VAS) is to measure the pain which is represented from (0) grade to (10) grade. Zero grade means no pain, (10) grade means unbearable pain, from 1 to 10 means graduation intensities of pain. The subjects were asked to indicate the level of pain by placing a dash at the appropriate level on the 10 cm horizontal line.

Data Analysis

The collected data were statistically treated and the following values were found minimum, maximum, mean, S.D., one sample paired t-test to compare between pre and post

in the group and two sample unpaired T-test to compare between 2 groups, at a confidence level of (P = 0.05).

RESULTS

The results of the stretching group:

There was a significant improvement of pain after physical therapy treatment from (7.04±0.82) to (2.86±0.75), ROM of dorsiflexion increased from (10.13±1.39) to (14.86±1.48), ROM of planterflexion increased from (25.86±6.44) to (34.27±3.4) and ADL (walking) decreased from (2.86±0.34) to (2.22±0.46), tab. (1) fig. (1).

Table (1): Pre and post values of pain, ROM of dorsiflexion, ROM of planterflexion and ADL (walking), in first group.

	Pain		ROM of dorsiflexion		ROM of planterflexion		ADL (Walking)	
	Pre	Post	Pre	Post	Pre	Post	Pre	Post
Min	6	2	7	12	18	27	2	2
Max	8	4	12	17	33	39	3	3
Mean	7.04	2.86	10.13	14.86	25.86	34.27	2.86	2.22
SD	0.82	0.75	1.39	1.48	6.44	3.4	0.34	0.46
t test	0.0007		0.009		0.007		0.035	

(*) significant, P ≤ 0.05

(**) no significant, P ≥ 0.05

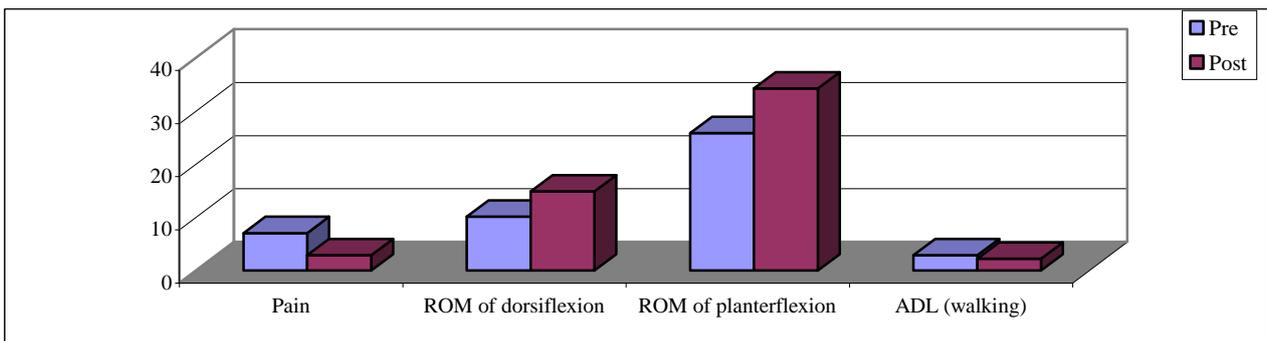


Fig. (1): The mean values of pain, ROM of dorsiflexion, ROM of planterflexion and ADL (walking), in first group.

The results of the second group:

There was a significant improvement of pain after physical therapy treatment from (7.18±0.93) to (2.86±0.69), ROM of dorsiflexion increased from (10.27±1.32) to

(15.13±1.58), ROM of planterflexion increased from (26.04±6.46) to (34.81±3.3) and ADL (walking) decreased from (2.86±0.34) to (1.31±0.51), tab. (2) fig. (2).

Table (2): Pre and post values of pain, ROM of dorsiflexion, ROM of planterflexion and ADL (walking), in second group.

	Pain		ROM of dorsiflexion		ROM of planterflexion		ADL (Walking)	
	Pre	Post	Pre	Post	Pre	Post	Pre	Post
Min	6	2	8	13	19	28	2	1
Max	9	4	12	17	32	40	3	2
Mean	7.18	2.86	10.27	15.13	26.04	34.81	2.86	1.31
SD	0.93	0.69	1.32	1.58	6.46	3.3	0.34	0.51
t test	0.0009		0.007		0.0008		0.025	

(*) significant, $P \leq 0.05$

(**) no significant, $P \geq 0.05$

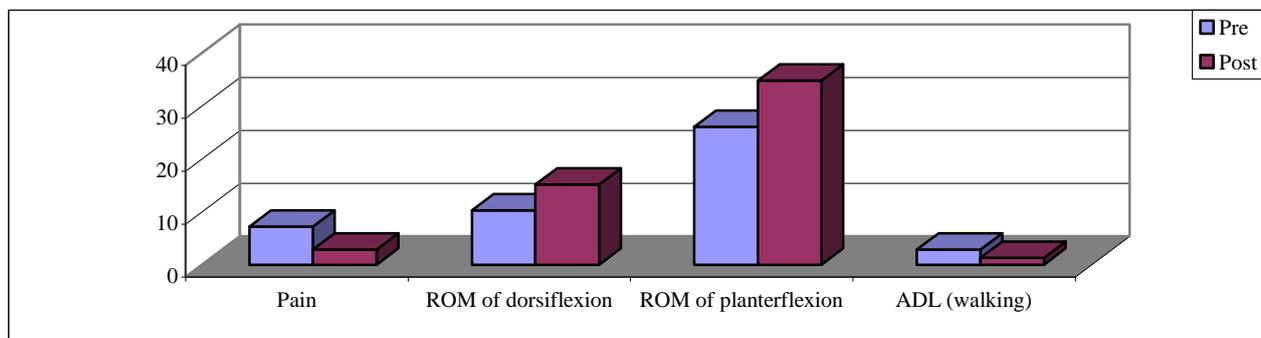


Fig. (2): The mean values of pain, ROM of dorsiflexion, ROM of planterflexion and ADL (walking), in second group.

Comparison between both group

1- There is no significant difference between pre measures of the first group and pre measures of the second group of pain, ROM of dorsiflexion, ROM of planterflexion, and ADL

(walking), where t. value of pain 0.3, t. value of ROM of dorsiflexion 0.4, t. value of ROM of planterflexion 0.6, and t. value of ADL (walking) 0.9 tab. (3) fig. (3).

Table (3): The mean values of pre test of pain, ROM of dorsiflexion, ROM of planterflexion and ADL (walking), ROM of trunk flexion, in both groups.

	Pain		ROM of dorsiflexion		ROM of planterflexion		ADL (Walking)	
	Pre 1	Pre 2	Pre 1	Pre 2	Pre 1	Pre 2	Pre 1	Pre 2
Min	6	6	7	8	18	19	2	2
Max	8	9	12	12	33	32	3	3
Mean	7.04	7.18	10.13	10.27	25.86	26.04	2.86	2.86
SD	0.82	0.93	1.39	1.32	6.46	6.44	0.34	0.34
t test	0.3		0.4		0.6		0.9	

(*) significant, $P \leq 0.05$

(**) no significant, $P \geq 0.05$

gr. (group)

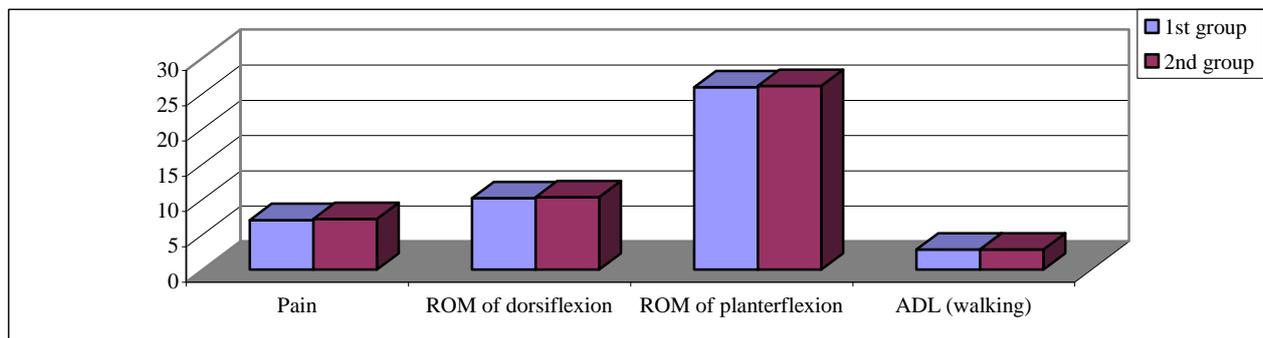


Fig. (3): The mean values of pre test of pain, ROM of dorsiflexion, ROM of planterflexion and ADL (walking), in both groups.

2- There is no significant difference between post measures of the first group and post measures of the second group of pain, ROM of dorsiflexion, ROM of planterflexion, and there is a significant difference of ADL (walking),

where t. value of pain 0.07, t. value of ROM of dorsiflexion 0.06, t. value of ROM of planterflexion 0.06, and t. value of ADL (walking) 0.03 tab. (4) fig. (4).

Table (4): The mean values of post test of pain, ROM of dorsiflexion, ROM of planterflexion and ADL (walking), in both groups.

	Pain		ROM of dorsiflexion		ROM of planterflexion		ADL (Walking)	
	Post 1	Post 2	Post 1	Post 2	Post 1	Post 2	Post 1	Post 2
Min	2	2	12	13	27	28	2	1
Max	4	4	17	17	39	40	3	2
Mean	2.86	2.86	14.86	15.13	34.27	34.81	2.22	1.31
SD	0.75	0.69	1.48	1.58	3.3	3.4	0.46	0.51
t test	0.07		0.06		0.06		0.03	

(*) significant, $P \leq 0.05$

(**)no significant, $P \geq 0.05$

gr. (group)

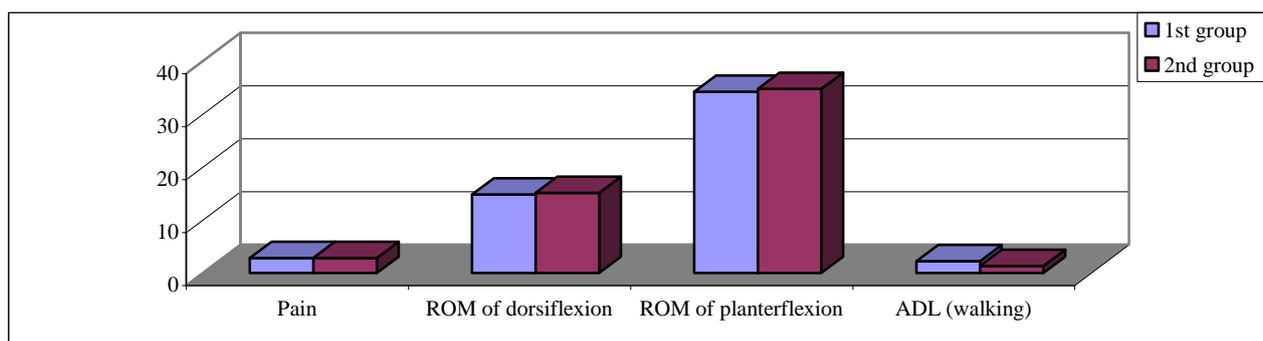


Fig. (4): The mean values of post test of pain, ROM of dorsiflexion, ROM of planterflexion and ADL (walking), in both group.

DISCUSSION

This study evaluated the effectiveness of two treatment of ankle sprains which are complete weight bearing and partial weight bearing and its effect on ADL.

The results of this study showed that, there was a significant results of the complete weight bearing program for pain and ROM of dorsiflexion and planterflexion due to using of exercises program in the form of strengthening exercises, stretching exercise and complete weight bearing during walking. Where all of the muscles around the ankle joint are acting in the form of concentric and eccentric contraction at the same time and interacting with each other for giving high stability of the joint through strengthening of all muscles around the ankle joint, and stretching which is gaining ROM.

Strengthening of muscles is improving ROM and function of dorsiflexion, planterflexion, eversion, and inversion of the ankle joint which is considered the walls of the ankle and must be strong enough to protect the joint²⁴.

Improving ROM and function of the muscles and joint state were creating a controlling and balancing between agonist and antagonist muscles of the ankle region and coordination of the movements i.e, improving active daily living specially walking so, there was a significant difference in ADL (walking)⁴. The use of an elastic bandage has fewer complications¹.

In the partial weight bearing group, improvement of pain was due to increasing the power of the muscles which break down the pain circle. Strengthening and stretching of the muscles is improving ROM and function of dorsiflexion, planterflexion, eversion, and inversion of the ankle joint. And also, the walking is improving.

The possible cause of chronic ankle instability is dorsiflexor, planterflexor, and evertor muscle weakness. Therefore, we emphasize strength training in the rehabilitation program for ankle instability²⁴.

Early functional rehabilitation of the ankle should include range of motion exercises and isotonic strength-training exercises¹³.

There are many treatment modalities for ankle rehabilitation. These are reviewed, and the most effective training programme for rapid restoration of ankle movement, strength, endurance, and proprioception is selected²⁷.

In comparison of results of both groups, there is no significant improvement of pain, ROM of dorsiflexion, and ROM of planterflexion but there is significant improvement of ADL (walking) only in the second group than in the first group, because the complete weight bearing was improving the function and stability of the muscles and the joint more than the exercises.

Our results are similar to other to randomized trails comparing early mobilization and weight bearing that have shown patients get back to work faster. The only difference in both groups was improving the ADL (walking) in the complete weight bearing group more than in the partial weight bearing group. Both early mobilization and weight bearing treatment of ankle sprains is giving excellent mechanical stability of the ankle⁴.

From all of the above, we showed that complete weight bearing are more beneficial than partial weight bearing immediately after ankle sprains.

Conclusion

We conclude that complete weight bearing is more beneficial than partial weight bearing immediately after ankle sprains in

return to function. But, both of them are effective in treatment of ankle sprains.

REFERENCES

- 1- Arnold, B.L. and Docherty, C.L.: Bracing and rehabilitation--what's new. *Clin Sports Med.* 23(1): 83-95, 2004.
- 2- Baker, J.M. and Ouzounian, T.J.: Complex ankle instability. *Foot Ankle Clin, Dec;* 5(4): 887-896, 2000.
- 3- Beynnon, B.D., Renstrom, P.A. and Alosa, D.M.: Ankle ligament injury risk factors: a prospective study of college athletes. *J Orthop Res, Mar;* 19(2): 213-220, 2001.
- 4- Eiff, M.P., Allen, T.S. and Gary, E.S.: Early Mobilization Versus Immobilization in the Treatment of Lateral Ankle Sprains. *J. Amr Sports Medicine,* 22(1): 83-88, 1994.
- 5- Feiler, S. and Frank, M.: [Pattern of injuries and risk of injury in skateboarding]. *Sportverletz Sportschaden, Jun;* 14(2): 59-64, 2000.
- 6- Grabiner, M.D.: Altered ankle joint proprioception in subjects suffering recurrent ankle sprains. *Med Sci Sports Exerc, Jun;* 32(6): 1185-1187, 2000.
- 7- Hubbard, T.J. and Denegar, C.R.: Does Cryotherapy Improve Outcomes With Soft Tissue Injury?. *J Athl Train, 9;* 39(3): 278-279, 2004.
- 8- Kannus, P. and Renstrom, P.: Treatment for acute tears of the lateral ligaments of the ankle. Operation, cast, or early controlled mobilization. *J Bone Joint Surg Am, Feb;* 73(2): 305-312, 1991.
- 9- Kibler, W.B.: Rehabilitation of the ankle and foot. *Functional Rehabilitation of Sports and Musculoskeletal Injuries.* Aspen Publishers Inc: 273-279, 1998.
- 10- LeBlanc, K.E.: Ankle problems masquerading as sprains. *Prim Care, Dec;* 31(4): 1055-1067, 2004.
- 11- Liu, S.H. and Nguyen, T.M.: Ankle sprains and other soft tissue injuries. *Curr Opin Rheumatol. Mar;* 11(2): 132-137, 1999.
- 12- Man, I.O. and Morrissey, M.C.: Relationship between ankle-foot swelling and self-assessed function after ankle sprain. *Med Sci Sports Exerc, Mar;* 37(3): 360-363, 2005.
- 13- Mattacola, C.G. and Dwyer, M.K.: Rehabilitation of the Ankle After Acute Sprain or Chronic Instability, *J Athl Train.* 2002 Dec; 37(4): 413-429, 2002.
- 14- Nussbaum, E.D., Hosea, T.M. and Sieler, S.D.: Prospective evaluation of syndesmotic ankle sprains without diastasis. *Am J Sports Med, Jan-Feb;* 29(1): 31-35, 2001.
- 15- Osborne, M.D. and Rizzo, T.D. Jr.: Prevention and treatment of ankle sprain in athletes. *Sports Med;* 33(15): 1145-1150, 2003.
- 16- Philbin, T. and Donley, B.G.: When do you x-ray ankle sprains in patients with acute ankle injuries? *Cleve Clin J Med, Jun;* 67(6): 405-406, 455, 2000.
- 17- Pugia, M.L., Middel, C.J. and Seward, S.W.: Comparison of acute swelling and function in subjects with lateral ankle injury. *J Orthop Sports Phys Ther, Jul;* 31(7): 384-388, 2001.
- 18- Refshauge, K.M., Kilbreath, S.L. and Raymond, J.: Deficits in detection of inversion and eversion movements among subjects with recurrent ankle sprains. *J Orthop Sports Phys Ther, Apr;* 33(4): 166-173; discussion 173-176, 2003.
- 19- Renstrom, P.A.F.H. and Kannus, P.: Injuries to the foot and ankle. *Orthop Sports Med;* 1705-1767, 1994.
- 20- Renstrom, P.A. and Konradsen, L.: Ankle ligament injuries. *Br J Sports Med, Mar;* 31(1): 11-20, 1997.
- 21- Specchiulli, F. and Cofano, R.E.: A comparison of surgical and conservative treatment in ankle ligament tears. *Orthopedics, Jul;* 24(7): 686-688, 2001.
- 22- Stasinopoulos, D.: Comparison of three preventive methods in order to reduce the incidence of ankle inversion sprains among female volleyball players. *Br J Sports Med. Apr;* 38(2): 182-185, 2004.
- 23- Trevino, S.G., Davis, P. and Hecht, P.J.: Management of acute and chronic lateral

- ligament injuries of the ankle. Orthop Clin North Am, Jan; 25(1): 1-16, 1994.
- 24- Willems, T., Witvrouw, E., Verstuyft, J., Vaes, P. and De Clercq, D.: Proprioception and Muscle Strength in Subjects With a History of Ankle Sprains and Chronic Instability, J Athl Train., 37(4): 487-493, 2002.
- 25- Wolfe, M.W., Uhl, T.L. and Mattacola, C.G.: Management of ankle sprains. Am Fam Physician, Jan 1; 63(1): 93-104, 2001.
- 26- Wright, I.C., Neptune, R.R. and van den Bogert, A.J.: The effects of ankle compliance and flexibility on ankle sprains. Med Sci Sports Exerc, Feb; 32(2): 260-265, 2000.
- 27- Zoch, C., Fialka-Moser, V. and Quittan, M.: Rehabilitation of ligamentous ankle injuries: a review of recent studies, Br J Sports Med., 37(4): 291-295, 2003.

المخلص العربي

المقارنة بين التحميل الكامل لوزن الجسم والتحميل الجزئي عند معالجة الالتواء الخارجي الحاد لمفصل الكاحل

الهدف من هذه الدراسة تقييم مدى تأثير برنامجين مختلفين للعلاج الطبيعي مباشرة بعد الالتواء الخارجي لمفصل الكاحل ، حيث يعتبر من أهم أسباب آلام المفصل مما يؤدي إلى إعاقة النشاط اليومي . تشمل الدراسة أربعون مريضاً من الذكور والإناث تتراوح أعمارهم من ثمانية عشر إلى خمسة و عشرون عاماً . بعد أن تم تشخيص المرضى إكلينيكيًا، تم تقسيم المرضى عشوائياً إلى مجموعتين متساويتان في العدد: المجموعة الأولى عشرون مريضاً خضعت لبرنامج العلاج الطبيعي المتمثل في عمل تمارين لتقوية عضلات ثني وفرد والانحناء الداخلي والخارجي لمفصل الكاحل مع استخدام رباط مطاطي لتثبيت مفصل الكاحل بتحميل جزئي لوزن الجسم ، وقد أجرى البرنامج لمجموعة واحدة 3 جلسات أسبوعياً لمدة ثلاثة أسابيع لمجموعة واحدة ، نفس البرنامج بنفس الأخصائي لكل مريض . المجموعة الثانية عشرون مريضاً، تم استخدام جهاز المشي اليدوي كتمارين لتقوية عضلات ثني وفرد والانحناء الداخلي والخارجي لمفصل الكاحل مع استخدام رباط مطاطي لتثبيت مفصل الكاحل مع تحميل كامل لوزن الجسم ، وقد أجرى البرنامج لمجموعة واحدة 3 جلسات أسبوعياً لمدة ثلاثة أسابيع لمجموعة واحدة ، نفس البرنامج بنفس الأخصائي لكل مريض . تم تقييم الألم بالمدراج البصري للألم والمدى الحركي لثني الجزء العلوي من الجسم بمقياس المدى الحركي للمفصل والمشي بمقياس اتحاد العظام اليابازي للأنشطة . وقد بينت النتائج الإحصائية وجود تحسن ملحوظ في الألم والمدى الحركي والمشي في المجموعة الأولى و في المجموعة الثانية وجود تحسن ملحوظ في الألم والمدى الحركي والمشي ، ووجود فارق ذات دلالة إحصائية بينهما في المشي فقط عند المقارنة بينهما . وقد ظهر من الدراسة أن برنامج العلاج الطبيعي الثاني المتمثل في التحميل الكامل لوزن الجسم أكثر تأثيراً لعلاج مرضى الالتواء الخارجي لمفصل الكاحل من برنامج التقوية بتحميل جزئي .