

Sustainable recovery in ankle sprains: the impact of manual therapy on stability and health outcomes

Recuperación sostenible en esguinces de tobillo: el impacto de la terapia manual en la estabilidad y los resultados de salud

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ABSTRACT

Background: The research project was developed in patients treated in the Physiotherapy area of the Laica Eloy Alfaro University of "Manabí" between the ages of 18 and 30 who present Grade 2 Ankle Sprain, to which the manual therapy, using a data collection instrument. **Methods:** The patients were first given a diagnosis of their condition to then apply the intervention in the affected area. Manual therapy sessions were held for weeks. In the intervention sessions, the affected foot was evaluated by measuring the goniometry in the ankle in terms of dorsiflexion, flexion, eversion and plantar inversion, where the anterior talofibular ligament was evaluated, the Daniels Test was also used to assess muscle strength. and the Eva Test to assess pain. **Results:** The intervention plan was executed with Mulligan's manual therapy and the results before and after the injury were compared, statistically evidencing that the treatment helped to significantly recover the grade two ankle sprain in a minimum of three weeks and in a maximum of 7. **Conclusions:** Mulligan's manual therapy is effective in the treatment of grade two ankle sprain due to the improvement and recovery of the injury in a short time.

Keywords: applied sustainability in pain health; manual therapy; sustainable healthcare interventions.

RESUMO

Antecedentes: O projeto de pesquisa foi desenvolvido em pacientes atendidos na área de Fisioterapia da Universidade Laica Eloy Alfaro de "Manabí" entre 18 e 30 anos que apresentam Entorse de Tornozelo Grau 2, aos quais a terapia manual, usando uma coleta de dados instrumento. **Métodos:** Os pacientes receberam inicialmente um diagnóstico de sua condição para, em seguida, aplicar a intervenção na área afetada. Sessões de terapia manual foram realizadas por semanas. Nas sessões de intervenção, o pé afetado foi avaliado medindo a goniometria no tornozelo em termos de dorsiflexão, flexão, eversão e inversão plantar, onde foi avaliado o ligamento talofibular anterior, também foi utilizado o Teste de Daniels para avaliar a força muscular. Eva Teste para avaliar a dor. **Resultados:** O plano de intervenção foi executado com a terapia manual de Mulligan e os resultados antes e depois da lesão foram comparados, evidenciando estatisticamente que o tratamento ajudou a recuperar significativamente a entorse de tornozelo grau dois em no mínimo três semanas e no máximo 7. **Conclusões:** A terapia manual de Mulligan é eficaz no tratamento da entorse de tornozelo grau dois devido à melhora e recuperação da lesão em pouco tempo.

Palavras-chave: sustentabilidade aplicada na saúde da dor; terapia manual; intervenções sustentáveis de saúde.

INTRODUCTION

The ankle sprain is one of the most recurrent injuries, both for the sedentary population and for those who perform some physical activity, a bad movement, fall, etc. it can cause an ankle sprain (1). Ankle ligament injuries can be grade I, II, or III. The characteristic clinical presentation of the first degrees is mild swelling, palpation tenderness, pain that does not prevent weight bearing when walking, and mild joint restriction. (Molina Rueda, 2022)

In contact sports, injuries are frequent, whether they are due to movements, lateral displacements or abrupt changes of direction, jumps, etc. Ankle sprains are injuries that present clinical pictures with various characteristics and can be suffered by any type of person; however, it is more common in those who play sports or keep moving frequently. (Nieto Amuy, 2022)

Neurodynamic techniques have been used since the 1980s, in addition to traditional treatments for problems of the musculoskeletal system. Previous studies have reported that neurodynamic techniques have physiological, neural, and mechanical effects (Erick Santiago, 2021). In grade 2 ankle sprain: There is 50% damage to the affected ligament, where there is an incomplete tear of a ligament, producing moderate functional disability, patients with this pathology must wait to return to their activity within 4 to 8 weeks. Among the special tests to diagnose an ankle sprain we have: ankle anterior drawer test 1 and 2, astragalin tilt test and suction sign. (Benavides Jimenez, 2021)

Kamali(2017) used talocrural manipulation once a day for 3 days in athletes with an ankle sprain. Won Hae also performed tibiofibular manipulation in chronic sprain and the intervention was performed for 2 weeks. After obtaining the results of these studies, it can be concluded that a combination of treatment techniques and osteopathy can greatly help the

recovery from injury of patients suffering from chronic or acute ankle sprains. (Escarmis Costa, 2001).

The biomechanics of the ankle cannot be understood if it is tried to be done separately from the foot as a whole, since it acts as a coordinated structure, so we will study it as a whole, differentiating mainly between movement and accommodation joints. (Cores, 2019). Although there are numerous studies about the use of Manual Therapy and exercise in different types of pathology and in different sports with a specific gesture above the head (baseball, tennis, volleyball, etc.), none has been carried out in paddle tennis, as indicated the study by Lafuente Pérez (2019).

KineticXer Instrumental Manual Therapy is an innovative physiotherapy technique. It has four instruments of different designs, characteristics and treatments according to the objectives set by the physiotherapist at the time of the initial evaluation. The results obtained at the end of the treatment were increased flexibility of the hamstrings and decreased pain on palpation. (Guillen, 2019).

Before tackling an ankle sprain, one must understand its anatomy and biomechanics. Physiotherapy treatment consists of three phases, where in Phase 1: control pain, in Phase 2: achieve normal ankle function and in Phase 3: Minimize the risk of suffering recurrences. (Balastra Amores, 2018).

Once the corresponding medical treatment is prescribed, physiotherapy assumes the rest of the functional progression (Vásquez Bustamante, 2017). The Decompression Manipulative Technique increases the strike rate and reduces the mean static pressure in terms of plantigrade support. It produces a reduction in intensity, modifies the type and location of pain (Monteverde & Ignacio, 2015). Ankle joint stability was found to be related to the degree of ankle sprain injury. A relationship was established between rhythm-velocity symmetry and the degree of sprain. A relationship was found between the degree of sprain and the perception of movement of joint receptors. (Arrate, 2015).

Acute ankle sprains can be diagnosed quickly and efficiently with a correct anamnesis and clinical examination. (Antolín Diez, 2013). The comparison of techniques is useful to define adequate physiotherapeutic treatments and subsequent to the clinical treatment decision based on the characteristics of grade II ankle sprain injury (Changoluisa Jácome, 2021). 7 articles with a total of 300 topics were included. The included studies investigated the recovery of functionality in patients undergoing Manual Therapy. Limitations: heterogeneity in the time of injury (Oliveira et al., 2019). After an analysis of the results obtained in the 8 clinical trials, it has been shown how balance exercises contribute and modify the variables of postural control, muscle strength and pain, although not all of them turn out to be of relevant importance to determine improvement. in patients with Chronic Ankle Instability. (Tamayo Vidal, 2018).

If recovery and timely treatment are not carried out or the patient does not train again, or rehabilitation is not carried out well, it will be easy to cause habitual ankle sprain, which will seriously affect labor and future life. (Sun & Zhang, 2022).

Chronic instability can be defined as the incidence of repetitive episodes of lateral ankle instability, which will result in recurrent ankle sprains. According to author Claudio H.T. In 2007, in the book Goniometry, it indicates that as a definition, goniometry applied to Medical Sciences is the technique used to measure the angles created by the intersection of the longitudinal axes of the bones at the level of the joints. Goniometry is an essential part of the detailed examination of the joints. The Muscle Strength Test: Physical quality that through muscle contractions allows you to overcome resistance or at least try. In the Daniels Test, grades are used for its assessment, which is done manually. It is recorded by means of a quantitative score that goes from zero, which represents normality in muscle strength, and also has a qualitative score. (Sanchez Amador, 2020).

This proposal is of great interest, due to the lack of significant previous studies on Manual Therapy and the benefits it provides in the treatment of ankle stability intervention in patients with grade 2 ankle sprain. This study helps as a precedent in carrying out future research in this age group, especially in Research where Mulligan's Manual Therapy is applied, in terms of the different therapy interventions, the aim being to contribute to an improvement in the functionality of patients. Mulligan's manual therapy was chosen since there is a documented scientific support and basis for all the treatment that can be applied in grade II ankle sprain.

In the history of manual therapy we find many individuals who have influenced and contributed their original and innovative knowledge to the development of manual therapy techniques and methods, such as Maitland, McKenzie, Kaltenborn, Elvery and last but not least. importance, Mulligan. As the quote from the first book on the mobilization with movement technique said. (Hing et al., 2019).

It was in 1985 when Mulligan had his first success with MCM, he finally changed his entire approach to manual therapy. After applying a series of treatment techniques of the time, consisting of passive joint mobilization and ultrasound, to the swollen and painful proximal interphalangeal joint of the second finger of a patient, with little success, and out of frustration, he tried applying a lateral slide sustained and painless with active flexion. The ankle joint is formed by the tibia, the fibula, the talus and the calcaneus, forming two joints: the tibiofibular and subtalar, which allow dorsiflexion, plantarflexion, inversion and eversion. (Viladot Voegeli, A, 2003).

The ankle has two fundamental functions in the proper biomechanics of the whole body: a static support function in which it has to be strong in order to support the weight of the whole body, and also flexible and elastic to absorb shocks. The ligaments are structures composed of collagen tissue that join the bones, their basic function being the stabilization of the joint passively, although they also perform a proprioceptive function since the joint has numerous peripheral nerve endings that are responsible for transmitting information through different position, movement and pain stimuli in order to effectively control the periarticular muscles. Therefore, the loss of proprioceptive sensitivity leads to an increase in recurrent lesions, even when there is no mechanical dysfunction. Ankle stability is related to bony architecture and soft tissue limitations. Said limitations or restrictions are composed of: the primary dynamic restrictions that are in charge of the peroneal tendons and the flexor tendons, and the main passive restrictions that are in charge of the complex lateral ligament, the extensor retinaculum, the peroneal retinaculum, the ligaments talocalcaneal and interosseous ligaments. (Pilamunga Cuaycal, 2020)

According to Gray's Anatomy, the ankle is reinforced by three groups of ligaments:

1. The lateral ligament, in turn, is made up of three fascicles:
 - a) the anterior talofibular ligament (LPAA).
 - b) the peroneocalcaneal ligament (LPC): it is the strongest in this compartment.
 - c) the posterior talofibular ligament (LPAP): it is extra-articular. It is responsible for limiting the eversion of the foot.
2. The medial or deltoid ligament: it is also formed by three fascicles that together give a triangular or fan shape.
3. The tibiofibular syndesmosis is made up of four fascicles. (Oiseth et al., 2023)

The foot has three important functions: motor function in which it produces the impulse to run or walk, balance function with the help of the ankle joint, and shock absorbing function in which it supports the weight of the rest of the body when running. The ankle sprain is one of the most recurrent injuries, both for the sedentary population and for those who perform some physical activity, a bad movement, fall, etc. It can cause an ankle sprain. (Galarza Buendia, 2017).

Ankle ligament injuries can be grade I, II, or III. The characteristic clinical presentation of the first degrees is mild swelling, tenderness on palpation, pain that does not prevent the load of body weight when walking and a slight restriction of the joint (Erick Santiago, 2021). Said injury is defined by O'Donogue as a "ligamentous injury due to overexertion that produces damage, to a variable degree, to the ligamentous fibers". Its injury mechanism is produced by an overload in the LPAA because it is a ligament that is not tense in dorsiflexion, while the ligaments deform when receiving the physiological load, and, therefore, the load occurs on a different area instead of on the mortise or tibiofibular-talar joint and increases the tension in the LPAA causing its distension or rupture (Arias Orosco, 2020) in a movement of plantar flexion and inversion.

Muscle weakness causes an alteration in motor control during walking and jumping, having a decrease in the anticipation of muscle activity, especially in the muscles of the proximal joints, such as the gluteus maximus and peroneus longus. Mulligan concept notations require the following details, preferably in sequential order: starting stance, side, joint(s), method of application (strap, self), applied glide(s), terminology (eg. , MCM,DANS,DAN), movement or function practiced by the patient, assisted (indicate if a second or third therapist is required), overpressure (and by whom), repetitions or time, series. (Albarrán Rodriguez et al., 2021).

Regarding joint mobilizations, we have mobilization with movement, which is applied at the level of the ankle joint, which combines active dorsiflexion and mobilization of the posterior talar slide in a loaded or unloaded position in order to improve dorsiflexion gliding and range of motion deficits. A strength and balance training program should be added for the gradual return to activity (McGovern & Martin, 2016). (Galarza Buendia, 2017).

The visual analogue scale (VAS) was initially used to assess mood states in patients who corresponded to a psychological study (5,19). Bond and Lader introduced it in 1974, as its high sensitivity and measurement validity was determined compared to other scales, because it is capable of evaluating intensities from mild to severe with greater precision (4,5,16,20). Likewise, it is easy to use, eliminates imprecise terminology, does not depend on language, and can quickly determine the level of pain according to the patient (4,20). Later it began to be used in Algology and was introduced in 1976 by Scott and Huskisson. The VAS is made up of a horizontal line of 10 cm (in some cases 100 mm), not less than this in order not to generate a high margin of error, and the patient is asked to indicate their level of pain with their finger (2, 13). Each centimeter of the line corresponds to a number, for example, centimeter three (30 mm) corresponds to level three of ten of pain and so on (5,20,24). The extremes of pain are indicated at each point: absence of pain on the extreme left and the worst imaginable pain at the end, on the extreme right (4,20). Some patients have conflicts to understand this last concept, which can be an obstacle to the evaluation, as well as difficulty in transpolating the nervous stimulus to a horizontal line, a concept that can be very abstract for the elderly. For research purposes, it has the great advantage over others that the VAS results can be taken as having a normal distribution (2,7,10,25). (Daniels & Worthingham, 2014).

Wilhelmine Wright and Robert W. Lovett, MD, Professor of Orthopedic Surgery at Harvard University Medical School, were the creators of the muscle testing system that incorporated the effect of gravity.^{1,2} Janet Merrill, PT, Director of Physical Therapeutics at the Children's Hospital and the Harvard Infantile Paralysis Commission in Boston, a former colleague of Dr. Lovett's, claimed that the tests were first used by Wright in Lovett's office gymnasium in 1912.³ (FAPTA & PT, 2007).

The original description of the tests, still used to a large extent today, was written by Wright and published in 1912.¹ Subsequently, an article by Lovett and Martin was published in 1916⁴ and a book by Wright in 1928.⁵ Miss Wright was a pioneer of today's physical therapists, although there were no physical therapy training programs in his day, and he was the head of Lovett's physical therapy practice. Lovett fully recognized its merits in his 1917 book *Treatment of Infantile Paralysis*,⁶ in which the tests for polio were developed. In Lovett's book, muscles were tested using a system of resistance and gravity graded on a scale from 0 to 6. Another early numerical scale used in muscle testing was described by Charles L. Lowman, MD, founder and medical director of the Los Angeles Orthopedic Hospital.⁷ Lowman's (1927) system covered the effects of gravity and full range of motion of all joints and was particularly useful in the assessment of extreme weakness. Lowman would later describe muscle balance techniques in the *Physiotherapy Review*, in 1940.⁸ In 1925, the physician H. S. Stewart published a very brief description of muscle balance techniques that was not anatomically or technically compatible with the tests carried out in the present time.⁹ His descriptions incorporated a grading system based on resistance, which, however, was not essentially different from that applied modernly, with elements such as the determination of the maximum resistance of a normal muscle, the performance of the movement against gravity without any other resistance and to an acceptable degree, and so on. Around the same time that Lowman's book was published, Arthur Legg, MD, and Janet Merrill, PT, were the authors of a small but valuable book on polio, released in 1932. This work, which featured a system of muscle balance techniques, was widely used in physiotherapy training programs during the 1940s. In it, the muscles were rated on a scale from 0 to 5, adding an additional value of "plus" or "minus" for all grades except 1 and 0.¹⁰ Among the first clinicians who structured muscular balance techniques in an organized way, complementing them with kinesiological interventions such as those currently used, it is worth mentioning Henry and Florence xii Introduction |Kendall. The first papers they wrote on the comprehensive approach to manual muscle testing were published between 1936 and 1938.^{11,12} In 1938 a monograph intended for all U.S. military hospitals was published and distributed under the auspices of the U.S. Public Health Service. Another of the first initial contributions in this field corresponded to Signe Brunnstrom and Marjorie Dennen, who, in 1931, released a study program that defined a movement grading system that replaced the assessment of individual muscles., as a modification of Lovett's work based on gravity and Resistance. (Avers, 2019)

The first text on muscle balance techniques still in circulation (of which five editions were published) was written by Lucille Daniels, MA, PT, Marian Williams, PhD, PT, and Catherine Worthingham, PhD, PT, and was published by first time in 1946.¹⁷ These three authors produced a complete manual on manual muscle balance techniques, concise and easy to use. (Daniels & Worthingham, 2014)

The previous drawer test was described in 1845. To perform the anterior drawer, the patient is placed lying down with the knee bent at 90 degrees, the examiner sits on the table on the ipsilateral side of the lesion and on the patient's foot. to make it fixed. The knee should be inspected from the side in order to observe a correct relationship of the tibia, which is somewhat anterior to the femur.

This test must be done routinely, however, it becomes relevant when examining bulky patients in whom the Lachman test becomes difficult. (Albarrán Rodriguez et al., 2021)

Classification and types of ankle sprain.

Depending on the ligamentous damage produced, we can classify ankle sprains into three types, from least to most serious:

1) Grade I. There is a "stretching", a distension of the affected ligament, usually the PAA, there is no associated joint laxity: the patient can walk, there is mild pain and in general the symptoms are few. Less than 5% of the fibers break.

2) Grade II. Partial rupture of the ligament occurs, moderate pain appears accompanied by mild joint instability. There is swelling and difficulty walking "on tiptoes." The subject walks in an antalgic position, and the signs and symptoms are more evident. Breakage of 40%-50% of the fibers has occurred. Scanning may reveal a positive previous drawer and/or forced reversal.

3) Grade III. There is manifest joint laxity, complete ligament tear, severe pain, frank deformity, and swelling. The subject cannot walk or put his foot on the ground. Exploratory maneuvers (vide infra) are positive. (Albarrán Rodriguez et al., 2021)

METHODS

The study is an observational investigation under a quantitative cross-sectional approach, an analysis and evaluation of the patient is carried out at the beginning of the diagnosis and at the end of the intervention, manual therapy was applied in the stability of the ankle in patients with high-grade ankle sprain. 2, in such a way that the technique is an alternative treatment in this type of injury, considering that it ranks fourth in Ecuador among the most frequent injuries. (Galarza Buendía, 2017). Place of research: This research work was carried out in the Physiotherapy Area of the Laica Eloy Alfaro de Manabí University located in the city of Manta in via San Mateo and Avenida Circunvalación, it is a Public Institution with different faculties and specialties, which It has environmental protection standards and guarantees free access to quality higher education in its academic and institutional processes.

Population: In the present investigation, 30 patients will be taken as a base between the ages of 18 and 30.

Exclusion and inclusion criteria.

Inclusion criteria:

- Patients treated in the Physiotherapy Area of the *Universidad Laica Eloy Alfaro de Manabí*, in September 2022.
- Patients who come with grade two ankle sprain.

Exclusion criteria:

- Patients with Grade 1 and 3 Ankle Sprain.
- Patients who present a fracture in the area to be evaluated.

To make the diagnosis of grade 2 ankle sprain, anterior ankle instability was assessed using the anterior drawer test with the patient in the supine position, holding the calcaneus with his caudal hand, so that the sole of the foot was facing the anterior face. of the forearm. With the cephalic hand the ankle was embraced, on the anterior face of the malleoli. An anterior traction of the foot was caused, avoiding any movement of the leg segment, resulting in a positive test as there was excessive anterior displacement of the talus under the tibiofibular mortise. In the test, the anterior talofibular ligament was evaluated and graded on a scale of 4 values (0-3), where 0 represents no laxity and 3 represents great laxity. This was done at the beginning and at the end of the intervention. Subsequently, the measurement of ankle joint mobility was carried out, where the angles were measured along the longitudinal axes of the bones of the ankle joint, which provided us with an analysis of the averages that have significant differences and were compared from the first to the second. last week of treatment, looking for a normal goniometric final result. The Daniels test was also used, being evaluated in different degrees of strength in the muscles involved in the ankle joint according to a scale from 0 to 5, adding an additional value of "more" or "less" for all degrees, and Eva's scale to measure the intensity of pain from 0 to 10, with 0 being no pain and 10 maximum pain.

In the treatment with the technique applied in manual therapy, with the patient in supine, prone or lateral decubitus according to the side to be treated, my seated or bipedal position at the patient's foot, placing the hands under the malleolus, calcaneus or talus of the affected ankle, the patient's foot should be on the edge of the stretcher, in the first week as there was generally pain I applied grade one for patient analgesia and advancing to grade two depending on the stage of the tissue condition if it is acute, subacute or chronic, in the second week depending on the discomfort, distraction was generated with anterior, posterior, medial, lateral sliding and at the end maintaining pressure and fixing again, later it oscillated for two minutes grade three, four and five to gain or recover the movement . When dorsiflexing, everting or inverting I dorsiflexed 5 to 10 degrees while sliding. When performing the slides I was able to help myself with the strap to fix the tibia and fibula, it was also useful for mobilization with movement as help from an external force. It was important to observe the stability or balance of each patient during the application of the technique week by week until complete recovery.

Data analysis plan.

Finally, with the results obtained, the results were tabulated through the statistical formulas that will be represented in tables and statistically analyzed in the SPSS program, to demonstrate the importance of manual therapy applied in grade 2 ankle sprain, and verify the efficacy of Mulligan's manual therapy in the treatment of grade 2 ankle sprains.

RESULTS

The sociodemographic results obtained in the Research Project in relation to age were obtained that the median is 23 years of the 30 patients, as can be seen in Table N.1, we group the results in ranges of 18-20 years in where 6 patients were obtained, in the range of 21-25 years, 17 patients were obtained as a result and in the range of 26 to 30 years, 7 patients were obtained.

Table 1. Patients' age

Frequency	Frequency	Percentage
18-20 years	6	20.0
21-25 years	17	56.7
26-30 years	7	23.3
Total	30	100.0

Source: Research Project

Among the patients who participated in the project, as shown in Table N.2, the population is divided into 20 men and 10 women.

Table 2. Sex of the patients

Sex	Frequency	Percentage
Male	20	66.7
Female	10	33.3
Total	30	100.0

Source: Research Project

In what corresponds to Table N.3, it is shown that the weight of the 30 patients has a mean weight value of 61,173, the result of the standard deviation is 6,943, the minimum weight is equal to 50 kg, and the maximum weight is 73 kilos, corresponding to the average height is 160, the value of the standard deviation is 9.77, while the minimum height is 143 cm and the maximum height is 175 cm.

Table 3. Weight and Height of the Patients.

Weight and Height		
	Weight	Height
Average	61.1730	160.1000
N	30	30
Standard Deviation	6.94359	9.77805
Minimum	50.05	143.00
Maximum	73.00	175.00

Source: Research Project

Table N. 4 shows the results obtained in the Diagnosis, the indicators were divided into 6 variables such as: VAS, Daniels, dorsiflexion, flexion, eversion and inversion, the results obtained were located in both the right and left foot as appropriate, having prevalence in the right foot with 16 patients and 14 in the left foot. The results of the mean, standard deviation and the number of cases were obtained.

Table 4. Results Obtained in the Diagnosis

Results Obtained in the Diagnosis							
Foot		EVA	Daniels	Dorsiflexion	Flexion	Eversion	Inversion
Right	Average	5.57	3.00	27.86	39.64	11.36	11.64
	Standard Deviation	0.51	1.04	6.11	10.09	4.48	2.65
	N	14.00	14.00	14.00	14.00	14.00	14.00
Left	Average	5.19	2.63	25.31	40.94	10.50	12.56
	Standard Deviation	0.40	0.96	3.86	5.54	4.24	3.01
	N	16.00	16.00	16.00	16.00	16.00	16.00
Total	Media	5.37	2.80	26.50	40.33	10.90	12.13
	Standard Deviation	0.49	1.00	5.11	7.87	4.30	2.84
	N	30.00	30.00	30.00	30.00	30.00	30.00

Source: Research Project

Table N.5 shows the consolidated results of the results obtained in the Intervention with regard to the Pain Climb (Eva), Daniels Test and in the goniometry where the following was assessed: dorsiflexion, flexion, eversion and investment. The 30 patients concluded their physiotherapy sessions with a pain scale of 0, muscle strength of 5, and normal values for ankle goniometry.

Table 5. Results in the Intervention

Results in the Intervention							
Foot		EVA_i	Daniels_i	Dorsiflexion.i	Flexion. i	Eversion. i	Inversion. i
Right	Average	0.5772	4.8374	37.4390	45.3089	14.1301	18.1951
	Standard Deviation	1.23480	0.48543	4.77896	4.55590	2.32576	3.03709
	N	123	123	123	123	123	123
Left	Media	0.4715	4.7480	36.3415	43.9675	13.9268	17.8780
	Standard Deviation	1.03485	0.59497	5.94763	5.96429	2.45006	3.35003
	N	123	123	123	123	123	123
Total	Media	0.5244	4.7927	36.8902	44.6382	14.0285	18.0366
	Standard Deviation	1.13812	0.54371	5.41202	5.33865	2.38601	3.19481
	N	246	246	246	246	246	246

Source: Research Project

In Table N.6, a comparison is made between before and after the intervention in the 30 patients, for example the variable: eva corresponds to what was obtained in the Diagnosis and VAS i is the result that was obtained in the Intervention, there is to consider that a before and after is taken, the table shows the mean, standard deviation and the number of cases.

Table 6. Comparison of Diagnosis and Intervention Results

Comparison of Diagnosis and Intervention Results													
Foot		EVA	EVA_i	Daniels	Daniels_i	Dorsiflexion	Dorsiflexion_i	Flexion	Flexion_i	Eversion	Eversion_i	Inversion	Inversion_i
Right	Average	5.5714	0.5772	3.0000	4.8374	27.8571	37.4390	39.6429	45.3089	11.3571	14.1301	11.6429	18.1951
	Standard Deviation	0.51355	1.23480	1.03775	0.48543	6.11250	4.77896	10.08889	4.55590	4.48257	2.32576	2.64886	3.03709
	N	14	123	14	123	14	123	14	123	14	123	14	123
Left	Average	5.1875	0.4715	2.6250	4.7480	25.3125	36.3415	40.9375	43.9675	10.5000	13.9268	12.5625	17.8780
	Standard Deviation	0.40311	1.03485	0.95743	0.59497	3.85951	5.94763	5.54339	5.96429	4.24264	2.45006	3.01040	3.35003
	N	16	123	16	123	16	123	16	123	16	123	16	123
Total	Average	5.3667	0.5244	2.8000	4.7927	26.5000	36.8902	40.3333	44.6382	10.9000	14.0285	12.1333	18.0366
	Standard Deviation	0.49013	1.13812	0.99655	0.54371	5.11084	5.41202	7.87109	5.33865	4.30196	2.38601	2.83735	3.19481
	N	30	246	30	246	30	246	30	246	30	246	30	246

Source: Research Project

In Table N.7, where the paired samples of the diagnostic and intervention variables are found in what corresponds to the T test, we can verify that the data obtained are statistically significant, the value of Sig(bilateral) is less than 0.05, in addition shows us the variables resulting from the confidence interval, the value of t and df of the paired samples.

Table 7. T test between Diagnosis and Intervention Results

	T test between Diagnosis and Intervention Results						t	gl	Sig. (bilateral)
	Average	Standard Deviation	Average of standard error	95% confidence interval of the difference					
				Lower	Upper				
EVA - EVA_i	5.36667	0.49013	0.08949	5.18365	5.54969	59.972	29	0.000	
Daniels - Daniels_i	-3.70000	8.42472	1.53814	-6.84584	-0.55416	-2.406	29	0.023	
Dorsiflexion - Dorsiflexion_i	-13.66667	5.56053	1.01521	-15.74300	-11.59033	-13.462	29	0.000	
Flexion- Flexion_i	-6.00000	7.58856	1.38547	-8.83361	-3.16639	-4.331	29	0.000	
Eversion - Eversion_i	-4.00000	4.19359	0.76564	-5.56591	-2.43409	-5.224	29	0.000	
Inversion - Inversion_i	-7.83333	2.87778	0.52541	-8.90791	-6.75875	-14.909	29	0.000	

Source: Research Project

Manual therapy is a set of therapeutic techniques with clinically important results for the treatment of patients diagnosed with ankle sprains. As indicated by the Research that has as its theme: Systematic review of manual therapy interventions for the treatment of ankle sprains, the participants who were selected for the studies manifested recurrent chronic ankle sprains or, failing that, chronic ankle instability as a sequel. Mainly, due to the clinical characteristics, it can be considered that the information and results evaluated can be extrapolated to grade I and II chronic lateral ankle sprains. The included studies agree that the selected manual therapy techniques demonstrate a high level of efficacy immediately on the evaluated indicators, but it is important to emphasize that the clinically relevant indicators for daily practice, such as pain, are not deeply valued, as well as the limitation to be able to establish points of comparison due to the absence of quantitative data. The object of the study was to demonstrate that manual therapy served as treatment and total recovery in grade 2 ankle sprain, as well as the satisfaction of seeing patients recovered and including them in their activities in their daily lives.

Conceptually, joint manipulation and/or mobilization in manual therapy is indicated for the approach to joint pain caused by stiffness, while mobility is also affected. Because in the works evaluated the objective revolved around assessing the dorsiflexion movement, an indicator that showed significant improvement. Taking into consideration the evidence presented in the research work, we allow ourselves to say that there is efficacy of the techniques performed in the short term, but that this effectiveness can be questioned when it is assessed considering the long term, likewise the most representative technique was Mulligan, who demonstrated that the MWM manipulation obtained a decrease in pain and an increase in function, according to reports it was significantly maintained for up to six months after the intervention. (Arias Orosco, 2020).

The findings of this systematic review show that manual therapy techniques are effective in improving clinical qualities, this information gives physical therapists the possibility of accessing evidence that allows treatment to be guided more effectively (Arias Orosco, 2020). On the other hand, the Research that has as its theme: Bibliographic research on the treatment of grade 1 ankle sprain with orthopedic manual therapy, says: after analyzing the results provided by the 10 selected bibliographies, it was found that there was a systematic review which performs 4 studies with 201 volunteers with ankle sprains treated with mobilization with movement. The authors point out that orthopedic manual therapy is one of the most beneficial alternatives for the treatment of grade I ankle sprain, which is indicated in the articles that were analyzed in this bibliographical investigation. James M, 2016, mentions that specifically in patients with grade I and II ankle sprains, there is a clearer vision of what is the approach that we can offer to the pathology, without forgetting that our patient must be treated individually (outside of any study) and with their previous respective evaluation (Permy Lobelos, 2020). Erik A, Patrick O, 2016, points out that with the help of nerve stimulation, greater postural control and control of the joint range is achieved. It is emphasized that each patient is treated differently, since not all patients in the present study reached the same answers. (Grandson Amuy, 2022).

Prosenjit B, Rati P, Manni W, Ovijit B, 2018, mention that we have two variables to compare, the patients who underwent the Mulligan MWM technique, and added to this, we consider the main clinical manifestations of an ankle sprain which are pain on movement and a reduced joint range due to pain. Marine S, Hélène L, 2019, indicate that pain is always linked to the limitation of normal joint ranges, a very probable consequence was reviewed in the same way, which is chronic ankle instability, which gives us another perspective of the application of the MWM and their performance controlled by the EVA scale at all times during the study process. M. Maetzler, M. Ruescher, F. Punzenberger, W. Wang, E.J Abboud, 2019, point out that the positive effects of fascial manipulation and the joint range of ankle dorsiflexion in the first 4 days after the injury, which adds information that explains in more detail with images which appreciate the concepts of orthopedic manual therapy focused on ankle sprains. Lucas B, Smokey F, Robert O, James M, Scott W, Alan N, 2019, point out that it is essential to evaluate the patient, before and after each rehabilitation session, this will provide accurate information and control about the progress that Our patient is experiencing throughout the rehabilitation program that we design for him. In their study, they mention that the patients who underwent MWM resumed their normal activities approximately 3 days after the physical rehabilitation program that was applied to them. John J, Susan A, Joseph M, Joseph S, Jay H, 2020, indicate that comprehensive treatment for rehabilitation should be applied, not only with work in our rehabilitation sessions, but also combine it with exercises at home. In an ankle sprain, the patient must have restrictions for certain activities, but what must be avoided is immobilization all the time, because as a consequence we could have muscle atrophies, fatigue, etc. Pain reduction was present one week after treatment. (Grandson Amuy, 2022). (Tasipanta Capelo, 2021).

As evidenced in previous research, manual therapy significantly helps in the recovery of grade two ankle sprain injury. As demonstrated by the results obtained in this Investigation in which Mulligan's Concept was applied to the participants in manual therapy, it was evidenced that it is a technique that has clinically important results in patients who have presented degree two ankle sprain, manifested to his time that manual therapy demonstrates a high level of efficacy in the short term in addressing pain, limitation of joint range and instability of the ankle effect.

CONCLUSIONS

According to the results obtained in the Investigation, it can be determined by means of the T student test at a confidence level of 95%, it gave us a lower result of p of 0.05 with which the null hypothesis is rejected, that is, if it is fulfilled that manual therapy is a reliable and efficient treatment alternative, which helps the physiotherapist recover the patient in most cases in 3 weeks, with 7 weeks being the maximum number of sessions where the treatment was performed.

In this research project it can be concluded that among the patients who attend the Physiotherapy Area of the Laica Eloy Alfaro University of "Manabí" one of the most frequent injuries is ankle sprain. In 50% of the patients who underwent Mulligan's manual therapy in the grade ankle sprain, they recovered in 3 weeks, 17 percent of the patients recovered in 4 weeks, 27 percent of the patients recovered in 5 weeks and 6 percent in seven weeks.

In this scientific study, it was possible to gain joint range, balance and pain relief, resulting in the functional recovery of the patient on his affected side and reincorporating him into his activities of daily life in a normal way, this was evidenced in the systematic control that was carried out through the observation sheet in the intervention sessions that were carried out on the 30 patients. Within the treatment, the Mulligan technique was applied, where results were obtained in the short (3 weeks) and medium term (7 weeks) in the total recovery of the patient, taking into consideration that not all people recover in the same way, and also consider the tissue on the affected side. A sequence without interruptions in the treatment was carried out thanks to the collaboration of each patient, which helped us significantly and we obtained the total recovery of the 30 participants, which did not go beyond two months, achieving our final objective.

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