



# Clinical Case Report Competition

West Coast College of Massage Therapy  
New Westminster

August 2014

Third Place Winner

## Chelsea Christensen

Will joint mobilizations to the foot decrease pain associated  
with hammer toe deformity? A case study

## Abstract

**Purpose:** The purpose of this case study was to determine if performing joint mobilizations to the foot would decrease pain associated with hammer toe deformity.

**Method:** Five treatments were performed over the course of four weeks, using grade two oscillation joint mobilizations to the foot. These mobilizations were applied to the calcaneus, talus, navicular and metatarsal bones of the foot. Mobilizations utilized were medial, later, superior, inferior and posterior glides as well as varus and valgus gaps. Progress was noted by using the Verbal Analogue Scale (VAS) pre and post treatment as well as on a daily basis with the use of a pain journal.

**Results:** The most significant results of this study show joint mobilizations decreased pain on a short term basis. Pain was reported to be significantly less post treatment than pre treatment, with results lasting for a couple days. However, with the addition of an aggravating activity the foot pain would come back. Long term effects of decreasing pain were minimal in this study.

**Conclusion:** This study supports other research findings that joint mobilizations will aid in the decrease of pain. Incorporating joint mobilizations to the foot would benefit patients presenting with hammer toe deformity in their

USING JOINT MOBILIZATIONS TO DECREASE PAIN ASSOCIATED WITH HAMMER TOE  
DEFORMITY

rehabilitation and pain management process. More research needs to be done  
before this hypothesis can be accepted for the relief of pain on a long term basis.

**Key Words:** Joint Mobilizations, Hammer Toe Deformity, Pain

## **Acknowledgements**

To my family and friends who have supported me throughout my time at West Coast College of Massage Therapy. To the clinic instructors who so diligently helped me through terms 2-5.

## Contents

Abstract.....	2
Acknowledgements.....	4
Introduction .....	6
Methods.....	9
Results.....	15
Discussion .....	18
Conclusion.....	20
References .....	21
Appendix A.....	23
Appendix B.....	24
Appendix C.....	28

## Introduction

Foot pain is something that has plagued young and old in many societies for years. In a study done on foot pain it was found that one out of five people in an average community complained of having foot pain affect them (Hill, Gill, Menz, Taylor, 2008). Michael J. Coughlin MD states that "although the lesser toes seem to be inconsequential because of their size, pain and deformity of the lesser toes may be a disabling condition," (Coughlin, 2002 p. 1446). Hammer toe deformity is defined as a deformity occurring at the proximal interphalangeal joint (PIPJ) of a lesser toe, which presents as plantar flexion at the PIPJ and dorsiflexion at the metatarsal phalangeal joint (MTPJ) (Kwon, Tuttle, Johnson, Mueller, 2009). This indicates that hammer toe falls in the category described by Coughlin as a lesser toe deformity thus being capable of causing a disabling condition. Hammer toe deformity commonly affects people of an older population. Because pain is the main characteristic of hammer toe (Coughlin, 2002), this often leads to complaints of pain in the forefoot (Kwon, Tuttle, Johnson, Mueller, 2009).

It is unknown what specifically causes hammer toe deformity to develop. However, experts agree that the cause is multi-factored. The main theories include: genetics, inflammatory arthritis, trauma, increased toe length, muscle imbalance between the flexors and extensors of the lower leg and foot, poorly

## USING JOINT MOBILIZATIONS TO DECREASE PAIN ASSOCIATED WITH HAMMER TOE DEFORMITY

fitting shoes, and tightened tendons and ligaments in the foot. These are all believed to play a potential role in pre-disposing someone to develop this deformity (Khan, 2012). There are two distinct categories that hammer toe deformities fall under, flexible or rigid. These categories describe the amount of mobility the patient has at the toe with the deformity. The chief characteristic of a flexible hammer toe is that it can be corrected passively. The treatment style is more conservative, being mostly restricted to taping, splinting and stretching, given that the patient isn't experiencing pain (Watson, 2012) (Coughlin, 2002). With rigid hammer toe deformity, the toe is unable to be passively moved to a neutral position and surgery is the most common treatment method. Surgeries to correct hammer toe deformity include flexor-to-extensor tendon transfers, resection arthroplasty of the PIPJ, MTPJ release and metatarsal shortening (V.Dhukaram, 2002) (Jennifer Shamus, 2004). The goal of these surgical procedures is not cosmetic in nature but rather aimed to decrease the pain caused by hammer toe deformity (V.Dhukaram, 2002). The reported negative effects as result of these surgeries include a misalignment of the toe (Coughlin, 2002), perpetuating stiffness felt in the joints of the forefoot, and pain (V.Dhukaram, 2002).

Patient reports of stiffness and pain felt in the foot after surgical correction of hammer toe deformity is what prompted this case study to examine the effects of joint mobilizations in decreasing foot pain associated with hammer toe.

## USING JOINT MOBILIZATIONS TO DECREASE PAIN ASSOCIATED WITH HAMMER TOE DEFORMITY

Oscillation joint mobilizations were chosen to be performed at a grade two level as this is an accepted yet relatively unstudied method to decrease pain (Hanrahan, Lunen, Tamburello, Walker, 2005) (Spila, 2010). Joint mobilizations are defined as passive movements utilized in such a way that mobile segments of the joints are mobilized without the use of muscle (Toni Green, 2001) (V.Dhukaram, 2002). Oscillation joint mobilizations are performed on a scale of one to five. However grade five is restricted to the use of chiropractors with extensive training in this mobilization, so for the purpose of this case study the focus will be on grades one through four. Grade one small oscillatory movements performed from the initiation of movement to tissue resistance using small amplitude movements. Grade two oscillations are also performed from the initiation of movement to tissue resistance, the difference being using large amplitude movements. Grade three is describes also as large amplitude movements performed within tissue resistance and back out again. Grade four mobilizations are small amplitude movements performed completely within tissue resistance. Grades one and two are utilized for the managements of pain and warm up techniques, where grades three and four are corrective grade mobilizations (Dixon, 2002). The physiology behind why joint mobilizations decrease pain is as follows. As you mobilize the joint with either oscillation movements or sustained glides in a range of grade one and two, you activate the mechanoreceptors in the joint which then inhibits the nociceptive signals at the brain and spinal cord thus decreasing muscle tension



## USING JOINT MOBILIZATIONS TO DECREASE PAIN ASSOCIATED WITH HAMMER TOE DEFORMITY

and decreasing the painful sensation (Sipila, 2010) (Tortora, Derrickson 2012). In previous studies done on hammer toe deformity it has been reported that a release of the soft tissues of the foot was necessary for adequate treatment (Dhukaram, Hossain, Sampath, Barrie, 2002). The origin of many flexor muscles of the foot including the plantar fascia is the calcaneus. Given that joint mobilizations cause a reflex effect of muscle relaxation, this case study hypothesizes that joint mobilizations to the foot specifically the calcaneus will decrease muscle tension, therefore decreasing the pain associated with hammer toe deformity. A verbal analogue scale (VAS) as well as a daily pain journal was used to qualify any changes of pain.

### **Methods**

Patient History: Patient was a 62 year old Caucasian female, who works as an ultra sound technician 3 days a week. It was noted in her intake form that 15 years ago she was in a motorcycle accident which resulted in a broken left femur and knee, resulting in a left knee replacement. She presented with rigid hammer toe deformity of the right second toe diagnosed by a medical doctor in 2000 and a flexible hammer toe deformity of the left second toe diagnosed at the same time. She received surgical correction for the rigid hammer toe deformity in 2002. The patient was unable to recall the name of the surgical procedure but did describe it as being a fusion of the DIPJ and PIPJ using Krischner wire which was later

## USING JOINT MOBILIZATIONS TO DECREASE PAIN ASSOCIATED WITH HAMMER TOE DEFORMITY

removed, the MTPJ remains moveable. Her chief complaint was of bilateral foot pain especially on the right foot around the first MTPJ as well as the plantar surface of the forefoot. When asked about the onset of pain she revealed that she had undergone a bunionectomy of her right great toe area when she was fifteen years old (1967) and has experienced foot problems ever since. The result of this surgery was the partial fusion of the MTPJ and interphalangeal joint (IPJ) of the right great toe. She stated that the foot pain from the bunion removal was a general ache in the entire foot lasting for approximately one year, differentiating the pain felt after the correction of the hammer toe deformity as a chronic ache and with activity a deep burning pain localized to the area of the forefoot. Though the left foot underwent no surgical treatment for the flexible hammer toe the patient complained of similar pain. After the surgery to correct the hammer toe deformity on the right foot other than a post surgical consultation with her surgeon and being referred to an orthotic specialist she underwent no physical/manual therapy. She is a very active woman, her activities including walking, biking and Tango dancing. She Tango dances once a week for three hours. Her reason for seeking therapy is that her foot pain was making it exceedingly painful to continue dancing and at the time of the initial interview hadn't danced in three weeks due to the pain. Upon further questioning, she revealed her routine for foot care pre and post dancing included taping each toe individually and after dance she would go home and soak her feet in warm water

## USING JOINT MOBILIZATIONS TO DECREASE PAIN ASSOCIATED WITH HAMMER TOE DEFORMITY

with Epsom salts which would relieve some of the pain. When asked about footwear she said that she dances in high heels (2 1/2") and is currently waiting for delivery of proper tango shoes as she believes that this will help lessen her foot pain. For her daily activities she wears running shoes with orthotics, however if she's going out at night she reports she always wears something with a heel (1"+).

Observations: In the initial observation of the frontal plane it was noted that she presented with a slightly elevated right shoulder. In the later view a slight hyper extension of the knees was noted as well as the patient presented with high arches bilaterally. These observations were made without orthotics on. It was also observed of the lower extremity that the second toe on both the right and left foot were longer than the great toe of each foot. This difference in length was not measured. A surgical scar was noted on the right great toe on the lateral aspect the length of the phalange.

Palpation: The plantar surface of the foot was palpated specifically the plantar fascia. On palpation that plantar surface felt of normal tension, it wasn't abnormally tight nor were there any adhesions palpated. Toes one to five were also palpated and were found to exhibit normal healthy tissue characteristics. The patient expressed no pain on any of the palpation.

## USING JOINT MOBILIZATIONS TO DECREASE PAIN ASSOCIATED WITH HAMMER TOE DEFORMITY

Movement: A function test was the first movement examination performed. The patient was asked to rise up onto her tippy toes for ten seconds. This was performed with no pain. A star diagram was then used to assess range of motion (ROM) at the MTPJ's only flexion and extension were observed. Active flexion of the right MTPJ's was recorded as being less than full ROM and stiffness was present. Active extension at the right MTPJ's was recorded at just below full ROM with no stiffness. Passive range of motion (PROM) of the MTPJ of the great toe in both flexion and extension was recorded as being at the same limit of AROM. PROM of toes two to five were charted as having full ROM in both flexion and extension. As the right great toe is partially fused at the MTPJ the ROM at this joint was only assessed at the initial treatment and as the hammer toe deformity is only effecting the lesser toes to create a uniform assessment after the initial assessment both great toe MTPJ's were excluded from the ROM charting.

Neurological: No neurological symptoms were reported by the patient.

Referred Pain: No referred pain was reported by the patient.

Special Tests: The Morton's Neuroma Test was performed at the initial assessment to rule out any tumors or stress fractures in the metatarsal area that could be a cause of the pain felt in the foot. The test was performed with the patient in the supine position and the heads of the metatarsals were gently grasped

## USING JOINT MOBILIZATIONS TO DECREASE PAIN ASSOCIATED WITH HAMMER TOE DEFORMITY

and squeezed together. This test was performed bilaterally and a negative result was achieved on both the right and left foot.

Treatment Goals: The goal of the treatments was to decrease the pain felt in both feet and have the patient be able to return to dancing.

Treatment Given: Each treatment started with a warm up of the tissue using general light Swedish massage starting with the left foot for two to five minutes. After this joint mobilizations were introduced. Mobilizations started at the hind foot with a distraction of the talus on the tibia and fibula. This was to introduce the patient to the feel of joint mobilizations. A posterior-superior glide and a medial and lateral glide were then performed of the calcaneus on the talus in an effort to decrease the tension of the flexor muscles attaching to the calcaneus. A dorsal glide of navicular on the talus was then performed to specifically target the muscles of the medial longitudinal arch and the structures making up the arch. This was then followed by dorsal and plantar glides of the intermetatarsal joints one through five to decrease the pain being experienced around the metatarsals. A dorsal glide of the second metatarsal was performed as well with the same intent as the previous dorsal glides. The last joint mobilization performed on the left foot was a varus and valgus gap of the first MTPJ as well as a dorsal and plantar glide to this joint. These mobilizations were chosen to maintain the mobility of this

## USING JOINT MOBILIZATIONS TO DECREASE PAIN ASSOCIATED WITH HAMMER TOE DEFORMITY

joint. The treatment of the left foot was then finished with the same light general Swedish massage for two to five minutes.

The treatment of the right foot presenting with hammer toe deformity started with light general Swedish massage to the right foot both plantar and dorsal aspects. Joint mobilizations then followed with a distraction of the talus on the tibia and fibula. Posterior-superior glides of the calcaneus on the talus were then administered along with medial and lateral glides of the same bones. A dorsal glide of the navicular on the talus was performed and the last joint mobilization was a dorsal glide of the intertarsal joints three, four and five. The treatment was finished with light general Swedish massage to the right foot for two to five minutes. All joint mobilizations to the right and left foot were performed at a grade two level using large amplitude oscillations lasting for two to three cycles per second. Each mobilization was performed for approximately one minute which was about the time the therapist experienced fatigue. The exact length in time of each mobilization was not measured. Each mobilization was repeated twice with a ten to fifteen second break between sets. Treatments were one hour in length which included fifteen minutes of assessment time and forty-five minutes of hands on time. Treatments were repeated once a week with six days between treatments except for the final treatment which was performed only five days after the fourth treatment due to scheduling difficulties.

## USING JOINT MOBILIZATIONS TO DECREASE PAIN ASSOCIATED WITH HAMMER TOE DEFORMITY

Remedial Exercise: No remedial exercise was given during this case study.

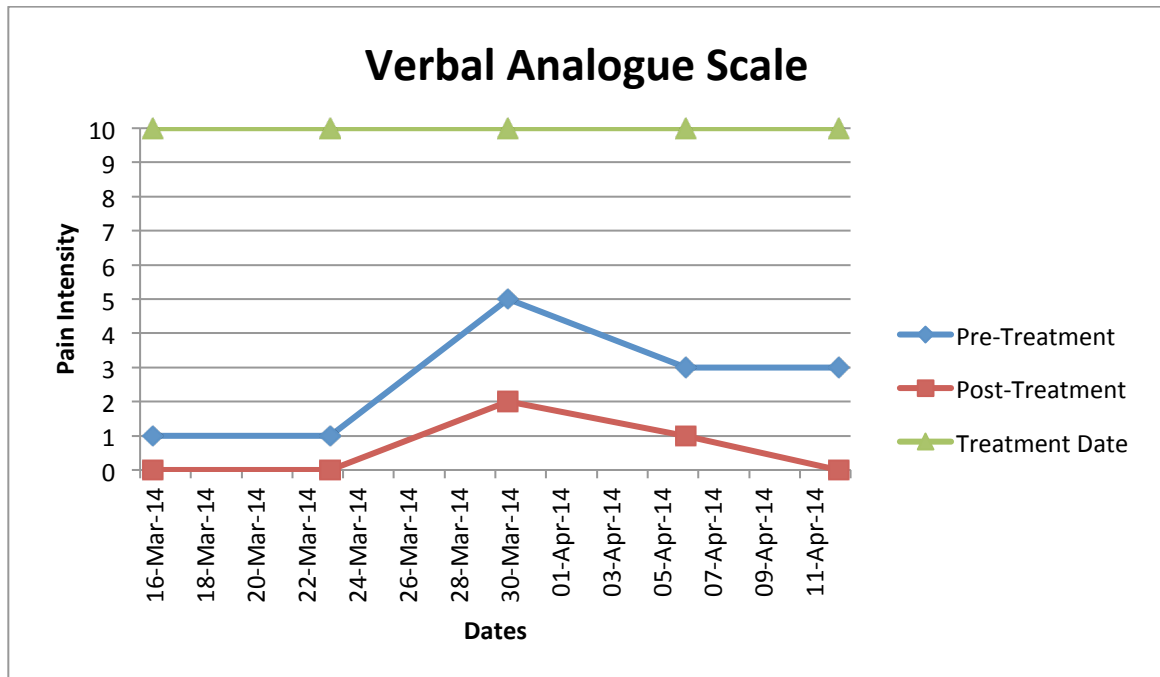
Hydrotherapy: The patient had a pre-existing hydrotherapy program before entering into this case study. This consisted of soaking her feet in warm water with Epsom salts if she was feeling pain especially after dance or other activities. This routine was modified to exclude the use of Epsom salts for the duration of the case study but no other changes were made. She reported the duration of her routine as a 20 minute warm water soak.

Tracking Progress: Progress was tracked using two methods. The verbal analogue scale (VAS) was used pre and post treatment as well as the patient kept a pain journal detailing how her feet felt before, during and after activities and if she self treated with her hydrotherapy program.

### **Results**

Based on this study the goal of decreasing foot pain using joint mobilizations in a patient with hammer toe deformity was accomplished in the short term. The patient felt a marked decrease of pain in her feet after each treatment compared to the pain felt pre-treatment (Graph 1).

USING JOINT MOBILIZATIONS TO DECREASE PAIN ASSOCIATED WITH HAMMER TOE DEFORMITY



**Graph 1: Verbal Analogue Scale pre and post treatment**

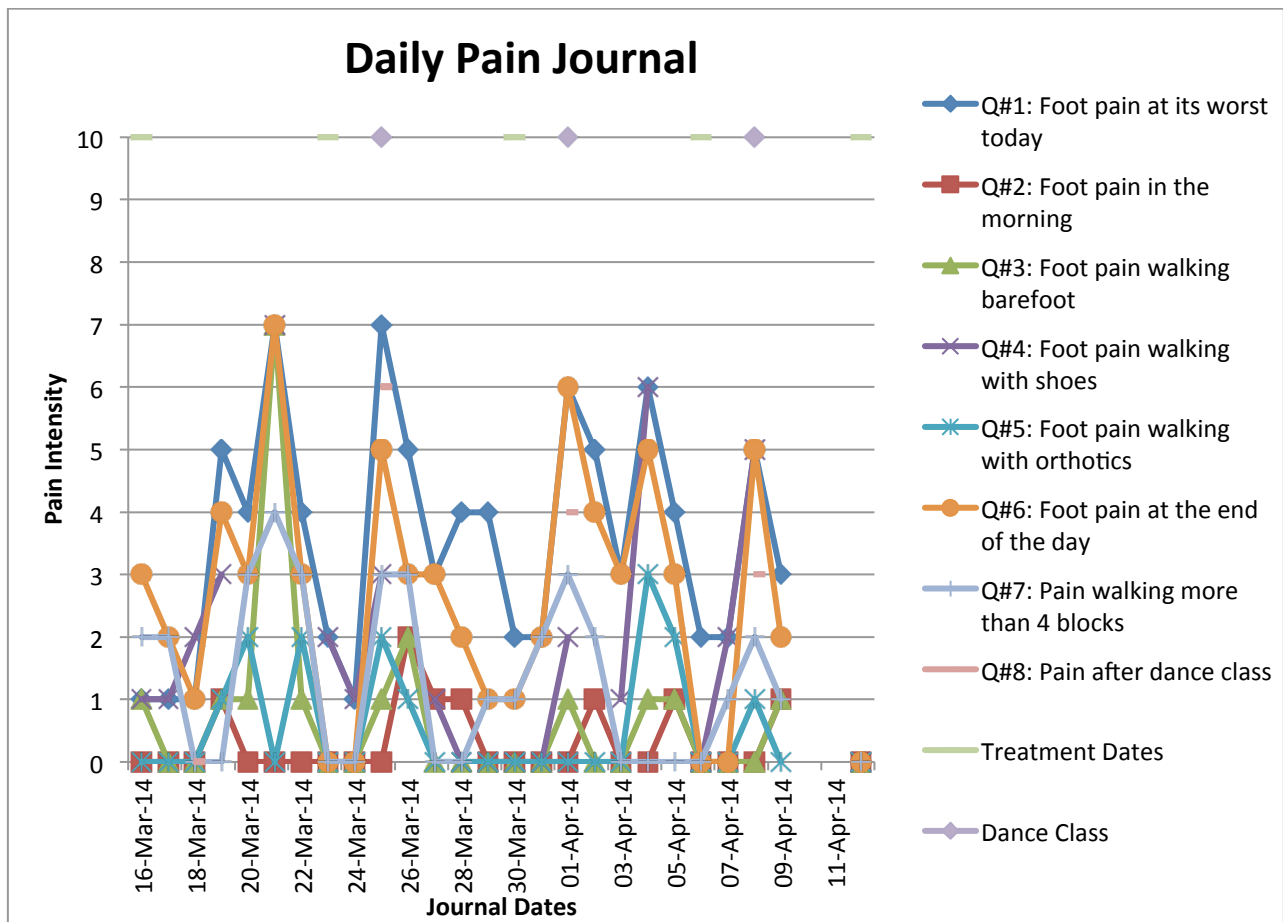
The patient was also asked to record her foot pain in a daily journal by answering a series of questions. These questions were based off of Budiman-Mark E et al: The Foot Function Index: a measure of foot pain and disability. It should be noted that the fourth question "foot pain walking with shoes" means walking in high heels (anything higher than 1") without orthotics as the patient identified this as both a common habit of hers and an aggravating factor for her feet. The fifth question " walking with orthotics" encompasses every other shoe worn as the patient has indicated that other than high heels she wears her orthotics in all other shoes. There is missing data from April 10-11, 2014 as the patient was away and forgot to take her pain journal with her. Due to a cold the patient also didn't attend



USING JOINT MOBILIZATIONS TO DECREASE PAIN ASSOCIATED WITH HAMMER TOE DEFORMITY

dance class on the Tuesday during the first week of treatment ( March 18, 2014).

Other missing data specifically for question number four is due to the fact that the patient only wears her orthotics the day after dance class to give her feet a rest (Graph 2).



Graph 2: Daily VAS as recorded in a pain journal

The re-assessment of the client on the last day of treatment revealed decreased tension of the plantar fascia on both feet compared to the initial

## USING JOINT MOBILIZATIONS TO DECREASE PAIN ASSOCIATED WITH HAMMER TOE DEFORMITY

treatment assessment, this was observed by palpation. The decreased tension was most significant in the right foot. The patient reported having no pain or stiffness with any walking or rising up on tip toes after the last treatment, ROM was also charted at a slight increase compared to pre- treatment. The increased ROM is believed to be due to the muscles relaxing around the joint allowing the joint to reach new ranges of motion pain free.

### **Discussion**

Since at the time of this case study there was a lack of pre-existing studies done on the management of pain associated with hammer toe deformity using joint mobilizations, this case study's findings were unable to be compared to others. However in studies done on the effects of joint mobilizations to decrease pain in joints such as the shoulder and cervical spine (G.Nicholson, 1985) (M.Sterling, 2001), this study supports their findings that joint mobilizations do have an analgesic effect. The goal of this study was to prove that joint mobilizations would be an effective modality in managing pain associated with hammer toe deformity. At the outset of this case study it was not specified whether the aim was to have long or short term relief of pain. Based on the findings it was found that while there was a marked reduction in pain from pre-treatment to post-treatment (Graph 1) the overall decrease in daily pain was minimal (Graph 2). This study found that joint mobilizations were able to

## USING JOINT MOBILIZATIONS TO DECREASE PAIN ASSOCIATED WITH HAMMER TOE DEFORMITY

decrease the pain in the feet for a couple days until an aggravating factor was re-introduced into the routine i.e. dance class, or the wearing of high heels. For a more accurate study of the effects of joint mobilizations in this context a larger sample size would be needed, focusing on patients with a diagnosis of either a rigid hammer toe or a flexible hammer toe. A future study should also time the treatments for the day after the participants engaged in an aggravating activity or eliminate major aggravating activities from the patients schedule while participating in the study. Due to scheduling availability this was not possible for this case study. Performing a gait analysis before the study began, half way through and post study should also be done to quantify results. At the beginning of this case study the patient hadn't been to dance class in three weeks due to pain and having a cold. During the first week of treatment the patient also didn't attend dance class because of being ill. This led to dance class not being introduced as a variable into this study until the second week. As a result the baseline of pain was slightly skewed. A more consistent baseline with a longer duration of a research study would be needed to prove any long term results of pain relief from using joint mobilization. No specific differences in decreasing pain were noted by the patient when asked about the effects of treatment with her right and left foot.

## **Conclusion**

This case study demonstrates that the effects of joint mobilization to the foot will decrease the pain associated with rigid and flexible hammer toe deformity for a short duration. Based on this it can be said that joint mobilizations as a modality should be incorporated by manual therapists in the post-surgical rehabilitation of rigid hammer toe deformity and as maintenance for flexible hammer toe deformity. Further study is needed to confirm any long term effects.

## References

- Catherine L. Hill, T. K. (2008). Prevalence and correlates of foot pain in a population-based study: the North West Adelaide health study. *Journal of Foot and Ankle Research* .
- Coughlin, M. J. (2002). Lesser -Toe Abnormalities. *The Journal of Bone and Joint Surgery* , 1446-1470.
- Dixon, M. (2009). *Joint Play the Right Way for the Peripheral Skeleton*. Port Moody, BC: Arthrokinetic Publishing.
- G.Nicholson, G. (1985). The Effects of Passive Joint Mobilizations on Pain and Hypomobility Associated with Adhesive Capsulitis of the Shoulder. *The Journal of Orthopaedic and Sports Physical Therapy* , 238-246.
- Hirst, I. (2002). Joint Mobilizations. In K. D. Kamala Shankar, *Therapeutic Physical Modalities* (pp. 177-193). Philadelphia: Hanley & Belfus Inc.
- Jennifer Shamus, E. S. (2004). The Effects of Sesamid Mobilization, Flexor Hallucis Strengthening, and Gait Training on Reducing Pain and Restoring Function in Individuals With Hallux Limitus: A Clinical Trial. *Journal of Orthopedic & Sport Physical Therapy* , 368-376.
- Kamala Shankar, K. D. (2002). *Therapeutic Physical Modalities*. Philadelphia: Hanley & Belfus, Inc.
- Khan, A. (2012, July 25). *Hammer Toe*. Retrieved June 1, 2014, from Healthline: <http://www.healthline.com/health/hammer-toe>
- M.Sterling, G. A. (2001). Cervical Mobilization: concurrent effects on pain, sympathetic nervous system and motor activity. *Manual Therapy* , 72-81.
- Magee, D. J. (2012). Lower Leg, Ankle and Foot. In D. J. Magee, *Orthopedic Physical Assessment* (pp. 886-887). Missouri: Elsevier.
- OY Kwon, L. T. (2009, October). Muscle imbalance and reduced ankle joint motion in people with hammer toe deformity.

## USING JOINT MOBILIZATIONS TO DECREASE PAIN ASSOCIATED WITH HAMMER TOE DEFORMITY

Sean Hanrahan, B. L. (2005). The Short-Term Effects of Joint Mobilizations on Acute Mechanical Low Back Dysfunction in Collegiate Athletes. *Journal of Athletic Training* , 88-93.

Sipila, V.-P. (2010). *The Rationale For Joint Mobilization as a Manual Technique*. Retrieved June 2, 2014, from OrthoSport Physical Therapy: <http://www.orthosportonline.com/Veli-s-Corner/Spine-Topics-and-Self-Help-Tips/Mobilization-Rationale/a~3206--c~342931/article.html>

Toni Green, K. R. (2001). A Randomized Controlled Trial of a Passive Accessory Joint Mobilization on Acute Ankle Inversion Sprains. *Journal of the American Physical Therapy Association* , 984-994.

V. Dhukaram, S. H. (2002). Correction of hammer toe with an extended release of the metatarsal phalangeal joint. *The Journal of Bone and Joint Surgery* , 986-990.

Watson, A. (2012, February 17). *Hammer Toe Deformity Treatment and Management*. Retrieved June 1, 2014, from MedScape: <http://emedicine.medscape.com/article/1235341-treatment#a1128>

## Appendix A

### Abbreviations

**Proximal Interphalangeal Joint-PIPJ**

**Distal interphalangeal Joint- DIPJ**

**Metatarsalphalangeal Joint- MTPJ**

**Interphalangeal Joint- IPJ**

**Verbal Analogue Scale- VAS**

**Range of motion- ROM**

**Passive range of motion- PROM**

**Active range of motion- AROM**

## Appendix B

### Foot Pain Journal

\* 0 = no pain, 10 = worst pain imaginable

**1) Foot pain at its worst today:**

0    1    2    3    4    5    6    7    8    9    10

**2) Foot pain in the morning:**

0    1    2    3    4    5    6    7    8    9    10

**3) Pain walking barefoot:**

0    1    2    3    4    5    6    7    8    9    10

**4) Pain walking with shoes:**

0    1    2    3    4    5    6    7    8    9    10

**5) Pain walking with orthotics:**

0    1    2    3    4    5    6    7    8    9    10

**6) Foot pain at the end of the day:**

0    1    2    3    4    5    6    7    8    9    10

**7) Pain walking more than 4 blocks:**

0    1    2    3    4    5    6    7    8    9    10

**8) After dance class:**

0    1    2    3    4    5    6    7    8    9    10

Comments:



USING JOINT MOBILIZATIONS TO DECREASE PAIN ASSOCIATED WITH HAMMER TOE  
DEFORMITY

Results of foot pain journal

Week 1

<b>Journal Date</b>	<b>Question #1</b>	<b>Question #2</b>	<b>Question #3</b>	<b>Question #4</b>	<b>Question #5</b>	<b>Question #6</b>	<b>Question #7</b>	<b>Question #8</b>
<b>Mar. 16 2014</b>	<b>1</b>	<b>0</b>	<b>1</b>	<b>1</b>	<b>0</b>	<b>3</b>	<b>2</b>	
March 17 2014	1	0	0	1	0	2	2	
March 18 2014	1	0	0	2	0	4	0	
March 19 2014	5	1	1	3	1	4	0	
March 20 2014	4	0	1		0	3	2	
March 21 2014	7	0	0	7		7	4	
March 22 2014	4	0	1		2	3	3	

Week 2

<b>Journal Date</b>	<b>Question #1</b>	<b>Question #2</b>	<b>Question #3</b>	<b>Question #4</b>	<b>Question #5</b>	<b>Question #6</b>	<b>Question #7</b>	<b>Question #8</b>
<b>Mar. 23 2014</b>	<b>2</b>	<b>0</b>	<b>0</b>	<b>2</b>	<b>0</b>	<b>0</b>	<b>0</b>	

USING JOINT MOBILIZATIONS TO DECREASE PAIN ASSOCIATED WITH HAMMER TOE  
DEFORMITY

March 24 2014	1	0	0	1	0	0	0	
March 25 2014	7	0	1	3	2	5	3	6
March 26 2014	5	2	2		1	3	3	
March 27 2014	3	1	0	1	0	3	0	
March 28 2014	4	1	0	0	0	2	0	
March 29 2014	4	0	0	0	0	1	1	

**Week 3**

<b>Journa l Date</b>	<b>Ques tion #1</b>	<b>Questi on #2</b>	<b>Questi on #3</b>	<b>Questi on #4</b>	<b>Questi on #5</b>	<b>Questi on #6</b>	<b>Questi on #7</b>	<b>Questi on #8</b>
<b>Mar. 30 2014</b>	<b>2</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>1</b>	<b>1</b>	
March 31 2014	2	0	0	0	0	2	2	
April 1 2014	6	0	1	2	0	6	3	4
April 2 2014	5	1	0		0	4	2	

USING JOINT MOBILIZATIONS TO DECREASE PAIN ASSOCIATED WITH HAMMER TOE  
DEFORMITY

April 3 2014	3	0	0	1	0	3	0	
April 4 2014	6	0	1	6	3	5	0	
April 5 2014	4	1	1		2	3	0	

**Week 4**

<b>Journal Date</b>	<b>Questi on #1</b>	<b>Questi on #2</b>	<b>Questi on #3</b>	<b>Questi on #4</b>	<b>Questi on #5</b>	<b>Questi on #6</b>	<b>Questi on #7</b>	<b>Questi on #8</b>
<b>April 6 2014</b>	<b>2</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	
April 7 2014	2	0	0	2	0	0	1	
April 8 2014	5	0	0	5	1	5	2	3
April 9 2014	3	1	1		0	2	1	
April 10 2014								
April 11 2014								
<b>April 12 2014</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	

**\*Treatment dates are bolded**

## Appendix C

### Treatment Charting