



Issue 42 - May 2021



THE 42ND OFFICIAL ISSUE OF THE PHYSIO NETWORK RESEARCH REVIEWS

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RESEARCH REVIEWERS



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Tom Goom is a physio who specialises in running injury and loves to run! He's the creator of Running-physio.com a published researcher and international speaker, presenting his popular Running Repairs Course all over the world!



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BEN CORMACK

Ben Cormack owns and runs Cor-Kinetic. He is a musculoskeletal therapist with a clinical background in sports therapy, rehabilitation, pain science & exercise stretching back 15 years. He specialises in a movement & exercise based approach with a strong education component and patient centred focus. Ben is a popular international presenter who has delivered conferences presentations and courses all over the world.



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RESEARCH REVIEWERS



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Mariana Wingood is a clinician, a program director of a CEU company that provides courses related to Geriatrics, and a PhD student studying physical activity prescription among physical therapists. She is an active member of the Vermont Falls Coalition, Gerontology Society of America, National Council on Fall Risk Awareness and Prevention, and the APTA's Academy of Geriatrics. Mariana has presented at various state, national, and international conferences.



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Sandy graduated from Pacific University (Oregon) in 1988 with a Master of Science in Physical Therapy and a Doctor of Physical Therapy degree from Des Moines University in December 2013. She has worked in multiple settings across the US with a neurologic and orthopedic emphasis including a focus in pelvic rehabilitation for pain and dysfunction. Sandy teaches and speaks internationally on the treatment of pelvic pain, and the application of pain science into clinical practice. Sandy's clinical interest is chronic pain with a particular interest in complex pelvic pain disorders for men and women. Sandy is the co-host of Pain Science and Sensibility, a podcast on the application of research into the clinic.

RESEARCH REVIEWERS



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Dr. Jarred Boyd (PT, DPT, MSAT, CSCS), a board-certified sports clinical specialist, serves as a performance therapist with the NBA Memphis Grizzlies. He has a keen interest in developing pragmatic reconditioning schemes for athletic populations while emphasizing the biopsychosocial model. He is also a part owner and lecturer for the continuing education company R2P Academy, teaching sports physical therapy principles and processes for improved reasoning and rationale behind decision making.



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Shruti Nambiar has completed her Masters in Clinical Sports Physiotherapy from Curtin University, Australia. She currently works as the Team Physiotherapist for the Indian U-17 Women's National Football Team. She has previously worked with the Indian Senior Women's National Football team and Ultimate Table Tennis league. Her areas of interest are tendinopathies, ankle sprains, chronic back pain, and promoting evidencebased practice.



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Anthony Teoli is a physiotherapist and PhD student in Rehabilitation Science at McGill University. His research focus includes gait biomechanics in individuals with knee osteoarthritis, clinical outcomes following total knee arthroplasty and knowledge translation. He is also the Founder/ President of InfoPhysiotherapy, an online platform dedicated to providing evidence-based continuing education for rehabilitation professionals worldwide. Anthony has presented his research and has presented on best practice for knee osteoarthritis management at provincial, national and international conferences.



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Sarah Haag is a physiotherapist and co-owner of Entropy Physiotherapy and Wellness in Chicago. At Entropy, Sarah specializes in women's and men's health, and on treating the spine and pelvis. She received her Doctorate of Physical Therapy and Masters of Science in Women's Health from Rosalind Franklin University in 2008. In 2009 she was awarded a Board Certification as a specialist in women's health (WCS). While not a researcher, she enjoys hanging out with researchers to shorten the gap between research and clinical application.



ANTEROMEDIAL VERSUS POSTEROLATERAL HIP MUSCULATURE STRENGTHENING WITH DOSE-Controlled in Women with Patellofemoral Pain: A Randomized Controlled Trial

By Tom Goom

- 1. 46 women with patellofemoral pain were included in this RCT which compared strengthening the anteromedial hip muscles (adductors, flexors and internal rotators) with the posterolateral hip muscles (abductors, extensors and external rotators).
- 2. Both groups also completed a warm-up, stretches and knee strengthening exercises.
- 3. Pain intensity and function improved in both groups with no significant differences in primary outcome measures between the groups.

BACKGROUND AND OBJECTIVE

Patellofemoral pain (PFP) is recognized as a multi-factorial condition but one where exercises to strengthen the hip and knee muscles can be beneficial (1). For the most part, hip exercises have tended to focus on the gluteal muscles which can be effective for improving pain and function, especially when combined with quadriceps strengthening (2). The exact mechanism of action for this is unclear and some studies show the addition of strength work on top of education and activity modification doesn't significantly improve outcomes (3).

This raises some intriguing questions: does it actually matter which muscles are the target of our rehabilitation? Are there other hip muscles that we may benefit from strengthening? This study sought to explore this by comparing the effectiveness of strengthening the anteromedial hip muscles versus posterolateral hip strengthening.

METHODS

This randomized controlled trial recruited 52 women with PFP, 46 of which completed

Assessment of each individual patient's strength should help us identify which is a priority for their rehab. Patellofemoral pain is recognized as a multi-factorial condition.

the study and all assessments. Participants were randomized to either the anteromedial hip strengthening group (AMHG) or the posterolateral hip strengthening group (PLHG).

Both groups performed a warm-up and stretches for the hamstrings, abductors, adductors, quadriceps and calf muscles, as well as squats and seated knee extension exercises for quadriceps strengthening. In addition to this, the PLHG performed hip abduction in side-lying, resisted clams and resisted hip external rotation, while the AMHG did hip adduction in side-lying, flex ring squeezes in side-lying and hip internal rotation against resistance. See the video for demonstration of these exercises.

All strengthening exercises were prescribed as 3 sets of 8 to 12 reps at 60-80% RPE (rate of perceived exertion). Exercise sessions were supervised, had an average duration of 60 minutes and were repeated twice per week for 6 weeks.

HIP STRENGTHENING EXERCISES



The primary outcomes were pain intensity (on a numerical scale) and function assessed by the Anterior Knee Pain Scale at 6 weeks. Secondary outcome measures included isometric strength testing and dynamic knee valgus during a stepdown test.

RESULTS

Both groups demonstrated improvements in pain and function, but there were no significant differences in the primary outcomes between the two groups (at the 6-week or 6-month stage). The PLHG reported pain intensity reducing from an average of 5.27 at baseline to 1.15 at 6 weeks. The AMHG had similar improvements from 5.04 at baseline to 0.57 at 6 weeks. Despite improvements in strength there was no significant change in dynamic knee valgus in either group.

LIMITATIONS

- This was a study on women with PFP so results may not be applicable to male patients.
- The intervention was multi-modal including stretching, knee strengthening and hip strengthening. It's unclear which of these interventions may have resulted in the improvements reported.
- The lack of a true 'wait and see' control also makes it difficult to rule out natural history / improvement over time, or contextual effects of regular supervised exercise and interaction with therapists.

CLINICAL IMPLICATIONS

This is a relatively small RCT, so we need to be careful in applying its findings without careful consideration. The results suggest that we should consider strengthening the anteromedial hip muscles (flexors, adductors and internal rotators) in women with PFP, and adds to existing evidence suggesting that posterolateral hip strengthening is also effective. Assessment of each individual patient's strength should help us identify which is a priority for their rehab.

A secondary finding is also noteworthy strengthening didn't appear to alter dynamic knee valgus during a step-down. This is in line with other research which has reported that strength work alone doesn't tend to significantly alter movement patterns. For example, strengthening the gluteals wont usually result in decreased hip adduction movement.

Likewise, strengthening the adductors isn't likely to *increase* hip adduction during function. If our goal is to alter movement patterns, the specific movement itself needs to be practiced with appropriate cues to achieve the movement goal.

A final thought is that the approach to strengthening with 3 sets of 8 to 12 reps at 60-80% RPE is in line with other research and may provide a fairly simple, clinically applicable approach to building strength in patients with PFP. As ever this approach needs to be adapted based on symptoms, goals and individual needs.

+ STUDY REFERENCE



Almeida G, Rodrigues H, Coelho B, Rodrigues C, Lima P (2021) Anteromedial versus posterolateral hip musculature strengthening with dose-controlled in women with patellofemoral pain: A randomized controlled trial. Phys Ther Sport, 49,149-156.

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ELECTROMYOGRAPHIC ANALYSIS OF SELECTED Shoulder Muscles During A Series of Exercises commonly used in Patients with Symptomatic degenerative rotator CUFF TEARS

By Dr Angela Cadogan

- 1. Bench and wall slide (closed chain) exercises resulted in low levels of infraspinatus activation and high levels of anterior deltoid and scapula muscle activation.
- 2. Anterior deltoid activation was highest in both open and closed chain elevation and may be enhanced with the addition of resistance where symptoms permit.
- 3. Scapulothoracic muscle activation was also highest in both open and closed chain elevation.

BACKGROUND AND OBJECTIVE

Exercise rehabilitation is now considered the primary intervention for people with degenerative rotator cuff tears (1,2). Exercises to strengthen the anterior deltoid and scapula muscles are often used in rehabilitation for people with symptomatic rotator cuff tears, to help restore function by improving the ability to elevate the arm while minimizing load on the rotator cuff. However, little information is available about the relative activation of the anterior deltoid, scapula and rotator cuff muscle groups during commonly used exercises, and whether muscle activation levels are affected by age.

This study aimed to evaluate the electromyographic (EMG) activity in the anterior deltoid, scapula and rotator cuff muscles during two rehabilitation programmes that are often used in rehabilitation for degenerative rotator cuff tears, and to assess any age-related differences in muscle activity.

Exercises that help restore the ability to elevate the arm while minimizing load on the rotator cuff are very useful for patients with symptomatic rotator cuff tears. Exercise rehabilitation is considered the primary intervention for people with degenerative rotator cuff tears.



55 healthy participants (30 men, 25 women) were recruited, aged between 18-60 years (mean 39 years). Surface EMG activity was measured during 13 exercises from two commonly used rehabilitation programmes (see the video for these exercises):

- A closed-chain exercise programme consisting of exercises to restore functional elevation of the arm using bench and wall slide exercises. EMG was measured in the anterior, middle and posterior deltoid; infraspinatus; upper, middle and lower trapezius; and serratus anterior.
- "Levy" exercises: a progression of open-chain exercises aimed at improving activation and strength of the anterior deltoid by progressively exercising the arm in elevation from a supine position to an inclined position (3,4). EMG was measured in the anterior, middle and posterior deltoid; upper trapezius; and serratus anterior.

ROTATOR CUFF TEAR REHABILITATION PROGRAMMES



EMG was recorded during three, five-second maximal voluntary isometric contractions (MVIC) with 15 seconds rest between contractions and 2 minutes rest between muscle groups. For each muscle, EMG was normalized using the highest activity level generated across the standard set of 8 muscle test positions. Muscle activity was categorised as follows: <20% of MVIC was considered low; 20%-50% of MVIC moderate; and >50% of MVIC high.

Muscle activity was compared across three age categories:

- Group 1: 18-32 yrs
- Group 2: 33-46 yrs
- Group 3: 47-60 yrs

RESULTS

Anterior deltoid activation

- Anterior deltoid showed highest EMG activity during closed chain elevation against resistance (39.5% MVIC) compared with open chain elevation (27.3% MVIC).
- During the "Levy" exercises, anterior deltoid activation was moderate during the inclined exercise (32.7% of MVIC) and low for all other exercises (<13% of MVIC).

Infraspinatus activation

 Infraspinatus activation was low (<16%) for all bench and wall slide exercises, and was lowest during bench slide exercises (<10% MVIC).

Scapula muscle activation

 Middle and lower trapezius and serratus anterior EMG was highest (14-31%) during closed chain wall slides on towel and open chain elevation.

Muscle activation by age-group

A significant interaction effect (p<0.05) for exercise x age was identified for the closed chain exercises. Increased muscle activity was recorded in the anterior deltoid, infraspinatus and middle trapezius in group 3 compared with group 1. Furthermore, there was decreased activity in the lower trapezius in groups 2 and 3 compared with group 1. No significant interactions were identified for exercises and age in the "Levy" exercise group.

LIMITATIONS

- Surface EMG is a method of indirectly assessing muscle activation and may be affected by skin movement and signal crosstalk.
- The study group was relatively 'young' in the context of degenerative rotator cuff tears and results cannot be generalized to those older than 60 years, or to those with symptomatic rotator cuff tears.
- The study may have been underpowered for age-group analysis.

CLINICAL IMPLICATIONS

In patients with symptomatic rotator cuff tears, a common activity limitation they have is a reduced ability to elevate the arm. Exercises that help restore this function while minimizing load on the rotator cuff are therefore very useful for this population group. This paper gives clinicians some great insights into such exercises.

For clinicians seeking exercises that demonstrate favourable activity in the anterior deltoid and scapula muscles while limiting activity in the rotator cuff (infraspinatus):

- Bench and wall slide exercises demonstrated low levels of infraspinatus activation (<16%), meaning these exercises may be appropriate where low load on the infraspinatus is desirable due to pain, or in post-operative rehabilitation programmes following rotator cuff repair surgery where protection of the repair is required.
- 2. Wall slides with theraband resistance and the "Levy" inclined elevation exercise may be appropriate exercises for specific anterior deltoid strengthening to help restore functional arm elevation in people with weakness, pseudoparalysis or following reverse shoulder arthroplasty where deltoid function is important.
- Open and closed-chain exercises in elevation showed the highest levels of scapula muscle activation (14-31%) and may be appropriate exercises where scapulothoracic strengthening is the clinical goal.

+ STUDY REFERENCE

<u>Cools A et al. (2020) Electromyographic analysis of selected shoulder muscles during a series</u> of exercises commonly used in patients with symptomatic degenerative rotator cuff tears. Journal of Shoulder and Elbow Surgery, 29(10), e361-e373.

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THE CATASTROPHIZATION EFFECTS OF AN MRI Report on the patient and surgeon and the Benefits of 'Clinical Reporting': Results from An RCT and blinded trials

By Ben Cormack

- 1. MRIs can lead to greater healthcare utilization but without improved outcomes.
- 2. Changing the reporting of MRIs to include an element of reassurance had a large positive effect over factual reporting.
- 3. Changing the terminology of MRIs had an effect on health care practitioner's behavior towards interventions.

BACKGROUND AND OBJECTIVE

Lumbar spine surgery is more frequently being used to treat low back pain (LBP), and the utilization of surgery has mirrored an increase in the use of magnetic resonance imaging (MRI). Despite comparable outcomes at one year (1), use of MRI over x-ray to assess LBP has been shown to result in three times the number of spine surgeries. Furthermore, patients who do not receive an MRI do as well as those who do receive one in both the short and long-term (2).

MRI has been associated with a nocebic effect potentially due to alarming terminology. MRI reporting without a clinical knowledge of the patient can potentially contribute to invasive interventions to normalize any spinal defects. MRIs negative influence on patients has not been formally investigated. Therefore, the aim of this paper was to:

- Study the effect of routine MRI reports on the perception of the patient and treatment outcome.
- Devise a clinical method of MRI reporting avoiding words and phrases that could cause fear and catastrophization in patients.

The way in which MRI reports are described to patients appears to have a large effect on outcomes. Use of MRI over x-ray to assess LBP has been shown to result in three times the number of spine surgeries.

 Carry out a blinded study to assess the effect of such reporting on the perception of the condition of the spine and decision-making.

METHODS

The study was conducted in three phases:

Phase 1

44 patients with chronic non-specific mechanical LBP of minimum 12 weeks were randomised to group A (n=21) who received a full factual explanation of the pathologies reported in their MRI, or Group B (n=23) who were reassured that their MRI was completely normal with only incidental and age-related findings. All patients had no significant pathologies on MRI.

Outcome measures used were severity of pain (VAS), pain self-efficacy questionnaire (PSEQ), and SF-12 to measure functional status. The groups were then compared at 6 weeks after similar conservative therapy.

Phase 2

An alternate method of 'clinical reporting' was evolved avoiding terminologies that caused concern or anxiety. A google search was used to identify this terminology that is available to patients.

Phase 3

20 MRIs were reported by both routine and alternative (clinical reporting) methods. The effect of this was then tested on four categories of health care professionals (ten each of spine surgeons (SS), general orthopaedic surgeons (OS), orthopaedic residents (OR), and physiotherapists (PT)). These clinicians were blinded on their assessment of the severity of the spinal condition, then rated their choice of treatment between conservative therapy, injection, and surgery; and the probability of requiring surgery.

RESULTS

Phase 1

For both the VAS and the PSEQ, the effect size between group A (factual reporting) and group B (reassurance) was large in favor of the reassurance group following the 6-week conservative care program. At 6 weeks the between-group effect size for VAS was 2.8499 and the PSEQ 2.998. This large between-group difference in favor of the reassurance group was due to deterioration in group A scores over the 6-week time period, as well as improvements in group B scores. The authors describe the PSEQ as a measure of a negative perception of disease, however the strict definition of the PSEQ measures confidence in the person's ability to perform activities despite pain. Therefore, it could be argued that the person's perception of their body and pain worsened following the exposure to the factual MRI report (3).

Phase 2

An alternate method of reporting avoiding potentially problematic terminology without losing the critical clinically relevant findings was developed using more scientific wording. This included: Modified Pfirrmann grading to substitute disc degeneration, dehydration, desiccation and bulge; Schizas grading for lumbar stenosis; high-intensity zone (HIZ) for annular tears and fissures; 'close proximity without compression' to indicate nerve root indentation / impingement or abutment.

Phase 3

All three measures – assessment of severity of the spinal pathology; choice of treatment between conservative, injections, and surgery; and the perceived probability of requiring surgery – changed significantly between routine and clinical reporting for the same patient's MRI.

LIMITATIONS

This study was a single-centre design and therefore may benefit from a larger multi-centre

trial to replicate the results in a wider population and reduce observer bias.

CLINICAL IMPLICATIONS

The clinical implications of this paper are clear for the first phase of this study. The way in which MRI reports are described to patients appears to have a large effect on the outcomes at 6-weeks following a program of conservative care. The primary outcome measure of the PSEQ was double the minimal clinical important difference at 6 weeks.

The second and third phases provide an interesting insight into healthcare professionals behaviour in regard to MRI reporting, with a decrease in the invasiveness of the suggested approach following the change in the reporting of the MRIs. This shows that it is not just patients but also healthcare professionals who are influenced by the way in which terminology is used in healthcare.

For clinicians, helping patients to understand the meaning and implications of MRI reports can be a key aspect of good care. This can involve explanations of the terminology, expanding on patient concerns, and also highlighting the frequency of similar findings in asymptomatic populations. These findings also have to correlate with the clinical assessment and not just be taken in isolation, in line with a modern multifactorial understanding of painful spinal conditions.

+ STUDY REFERENCE

Rajasekaran S, Dilip Chand Raja S, Pushpa B, Ananda K, Ajoy Prasad S & Rishi M (2021) The catastrophization effects of an MRI report on the patient and surgeon and the benefits of 'clinical reporting': results from an RCT and blinded trials. *European spine journal*: Advance online publication.



Ben Cormack

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CLINICAL OUTCOMES, STRUCTURE, AND FUNCTION Improve with both heavy and moderate Loads in the treatment of patellar Tendinopathy: A randomized clinical trial

By Todd Hargrove

- 1. A heavy loading protocol was not superior to a moderate loading protocol in the treatment of patellar tendinopathy at 12 weeks or 1-year follow-up.
- 2. Both groups experienced significant improvement but did not reach normal VISA-P values for healthy tendons after one year.

BACKGROUND AND OBJECTIVE

Patellar tendinopathy is a common presentation seen in the clinic. The most popular treatment strategies for patellar tendinopathy involve loading interventions, but the optimal volume and intensity is unknown.

This study was a randomized controlled trial comparing the effects of heavy versus moderate loading on pain, function and tendon structure in the short and long-term in those with patellar tendinopathy. The most popular treatment strategies for patellar tendinopathy involve loading interventions.

were the bilateral leg press and unilateral knee extension.

METHODS

The participants included 44 male athletes, aged 20-45, with a diagnosis of patellar tendinopathy lasting between 3 and 12 months.

The participants were randomized into two groups: moderate resistance and heavy resistance exercise. Each group exercised for 12 weeks, with the primary difference in protocol being the amount of resistance used. The moderate group exercised with loads of 55% of one repetition max (1RM), and the heavy group used 90% 1RM. The two primary exercises used

Because the two loading protocols had similar results, clinicians should prescribe loading based on patient preference to help improve adherence. The primary outcome was scoring on the Victorian Institute of Sport Assessment-Patella (VISA-P) questionnaire at 12 weeks. The VISA-P is a valid outcome measure for patellar tendinopathy and includes 8 questions about symptoms and function. The answers are used to compute a score between 0 and 100, with 100 indicating no symptoms. The minimal clinically important difference for the VISA-P in athletes with patellar tendinopathy is considered to be 13 points.

Other assessments were done at 6 weeks, 12 weeks, and 52 weeks, and these included pain during activity, various functional tests, ultrasound and MRI analysis of tendon structure, vascularization and swelling.

RESULTS

There were no statistically significant differences between groups immediately after the intervention at 12 weeks, or at one-year followup, for the primary outcome (VISA-P). There were also no significant differences in other outcomes, including pain during sporting activity, strength, jumping ability, patient satisfaction, and tendon thickness.

Each group experienced significant improvements but did not reach normal VISA-P values for healthy tendons. For example, on the VISA-P, the heavy resistance group improved from 58.8 at baseline to 70.5 at 12 weeks, and 79.7 at 52 weeks. The moderate resistance group improved from 59.9 at baseline to 72.5 at 12 weeks, and 82.6 at 52 weeks.

The authors concluded that heavy loading was not superior to moderate loading for any outcomes.

LIMITATIONS

This study did not include a control group who did not exercise, and therefore it is unknown whether the participants would have improved over time without exercise.

Although the two groups engaged in the same amount of training volume, rate of loading, sets, and sessions; they engaged in different amounts of repetitions and total time under tension, and differences in these variables may have affected the outcome.

CLINICAL IMPLICATIONS

Patellar tendinopathy is a common overuse injury of the knee, especially in athletes. For example, in volleyball players, rates may be as high at 45% (1). Symptoms include pain during activity, localized tenderness on palpation, and reduced function (2). Histopathological assessment may reveal disorganized collagen, and increased water, vascularization, and cellularity (3).

Fibroblasts in tendons respond to load by increasing collagen production and other components of tendon growth (4). Therefore, the preferred treatments for tendinopathy involve loading interventions. Eccentric loading protocols have been popular, but a recent review concluded that eccentric contractions offer no advantage over concentric in the treatment of tendinopathy (5).

Other research has shown that heavy loading protocols (90% of 1RM) are superior to moderate protocols (55% 1RM) for increasing tendon stiffness and cross-sectional area (6). However, the optimal loading protocol for patellar tendinopathy remains the subject of debate.

This study compared a heavy versus moderate loading protocol in the treatment of patellar tendinopathy. Although the authors expected that the heavy loading protocol would be superior, it brought about the same results as moderate loading.

One clear takeaway from this study is that the participants experienced continuous significant improvement but not a return to healthy tendon scores after one year. This highlights the long-term nature of tendinopathy prognosis. Furthermore, because the two loading protocols had similar results, clinicians should prescribe loading based on patient preference to help improve exercise adherence.

+ STUDY REFERENCE

Agergaard A, Svensson R, Malmgaard-Clausen N et al (2021) Clinical Outcomes, Structure, and Function Improve With Both Heavy and Moderate Loads in the Treatment of Patellar Tendinopathy: A Randomized Clinical Trial. *The American Journal of Sports Medicine*, 49(4), 982-993.



Todd Hargrove

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IMMEDIATE OUTCOMES FOLLOWING THE GLA:D[®] Program in Denmark, Canada and Australia. A Longitudinal Analysis including 28,370 patients With Symptomatic knee or hip osteoarthritis

By Mariana Wingood

- 1. Exercise combined with patient education is an underutilized intervention for patients with hip or knee osteoarthritis (OA).
- 2. Individuals with hip or knee OA who participate in "Good Life with OsteoArthritis (GLA:D[®])" have reported a reduction in pain intensity and improved walking speed, chair stands, and quality of life.
- 3. Individuals with knee osteoarthritis had better outcomes than those with hip osteoarthritis.

BACKGROUND AND OBJECTIVE

Research continues to recommend exercise and patient education as first line treatment for osteoarthritis (OA) (1). Yet, patients with OA are not receiving exercise prescriptions regularly (1). To address this gap, the authors of this study designed an exercise initiative titled "Good Life with OsteoArthritis (GLA:D[®])". The GLA:D[®] program is a structured 8-week long education and exercise program targeted for individuals with symptomatic knee and hip OA (2). See Table 1 for program details (2,3).

According to GLA:D[®]'s initial intervention study, participants of GLA:D[®] had lower pain intensity, improved quality of life, improved physical function, improved physical activity, lower needs for painkillers, and fewer missed days from work (2). However, since this was the first study looking at GLA:D[®], a follow-up study needed to be conducted to identify if the outcomes were replicable. This study aimed to examine if the outcomes of GLA:D[®] were similar across three different countries. Research continues to recommend exercise and patient education as first line treatment for osteoarthritis.

METHODS

- Location: Denmark (2013), Canada (2015), and Australia (2016)
- Intervention: Table 1
- Outcome measures: pain, 30-second sit-tostand, 40-m walk test, and knee injury and osteoarthritis Outcome Score (KOOS) / Hip dysfunction and Osteoarthritis Outcome Score (HOOS) - the 'quality of life' subscale scores.

RESULTS

A total of 28,370 participants, across 785 clinics, participated in this study. In general, improvements were smaller among participants with hip OA compared to knee OA. After completing the GLA:D[®] program, participants across the three countries had a reduction of 26-33% in mean pain intensity as well as improved walking speed by 8-12%, chair stand by 8-30%, and KOOS/HOOS quality of life by 12-26%.

The GLA:D[®] program has strong potential to impact the life and function of a patient with hip or knee osteoarthritis.

TABLE 1 - GLA:D® PROGRAM DESCRIPTION

Patient Education	Exercise Program
 <u>Session 1:</u> What is osteoarthritis? Risk factors Symptoms Introduction to treatment <u>Session 2:</u> Exercises Activities of daily living Coping Self-help tools <u>Session 3:</u> Expert patient: To live with osteoarthritis 	 Group-based NEuroMuscular Exercise program (NEMEX): 12 sessions - each one 60 minutes Supervised by a physical therapist 3 parts: Warm-up: ergometer cycling for 10 minutes Circuit-training: core stability/postural function, postural orientation, lower extremity strengthening, and functional exercises performed for 2-3 sets and 10-15 repetitions Cool-down: stretching

LIMITATIONS

The major limitation of this study was the lack of a control group. Without a control group, the authors cannot conclude that the improvements seen are related to the GLA:D[®] program. For example, the improvements could be due to the ability to see a physical therapist for 8 weeks. An additional limitation was the lack of information about community mobility, both pre-intervention and post-intervention.

CLINICAL IMPLICATIONS

The similarities between the initial study and this well-powered study with a large number of participants from three different countries help identify that the initial results are reproducible. The reproducibility is promising and suggests that the GLA:D[®] program has strong potential to impact the life and function of a patient with hip or knee OA. It also suggests that the program can be adapted to different contexts, populations, and health care systems.

As this program has been implemented in clinical settings and the interventions were well documented, clinicians can use portions (or all) of this program in their clinic. The equipment needed is a bike and resistance bands. The exercises include bridging/pelvic lifts, sit-ups, four-way sliders (forwards, backwards, and sideways), four-way lunges, four-way resistanceband exercises, chair stands, stair climbing, and step-ups.

For additional instructions about the program, it is recommended to look at the initial GLA:D[®] program and NEMEX-TJR program publication. Both authors did a great job explaining the interventions and providing supplemental material with pictures (2,3).

+ STUDY REFERENCE

Mariana Wingood

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ROTATOR CUFF-RELATED SHOULDER PAIN: IS IT TIME TO REFRAME THE ADVICE, "YOU NEED TO STRENGTHEN YOUR SHOULDER"?

By Dr Teddy Willsey

- 1. Individuals with rotator cuff-related shoulder pain typically present with deficits in strength, muscle activation, and kinematics compared to pain-free individuals. However, improving these factors may not be necessary to achieve positive clinical outcomes.
- 2. Although strength training has been shown to improve clinical markers of pain and function, the mechanism of action is multi-faceted.
- 3. The rationale for prescribing strength training exercises for shoulder pain should be framed within a context of helping individuals improve their quality of life, rather than just simply getting stronger.

BACKGROUND AND OBJECTIVE

The diagnosis of rotator cuff-related shoulder pain (RCRSP) has evolved into a clinical conundrum. Attempting to identify the pathoanatomical pain-generating source and distinguishing between bursitis, tendinitis, impingement, or a cuff tear can be futile.

Many practitioners have abandoned methods they once relied on, as both advanced imaging and special tests are consistently shown to be hypersensitive and insufficiently specific (1,2). The ambiguity of diagnosis, variability in symptoms, and relative success of non-surgical intervention has led to a deeper investigation and a growing body of evidence supporting conservative treatment (3).

Although there is robust research supporting a wide variety of conservative interventions, including at-home therapy, education, gentle exercise, and manual therapy for shoulder pain, many clinicians are now favoring a "just strengthen it" resistance training approach to treating RCRSP (4).

Exercises should be chosen in a manner that helps patients reduce the burden of their decreased shoulder function and resume meaningful activities. Special tests of the shoulder are consistently shown to be insufficiently specific.

While exercise therapy is undoubtedly important in the management of RCRSP, there is uncertainty regarding which approach is best and the absolute benefit of exercise compared to non-exercise interventions. It would be wise for clinicians to take a step back in order to better understand the overall mechanism of action and how to best structure their interventions.

METHODS

The authors of this viewpoint paper utilized 15 papers to inform their writing, while providing 23 additional resources in an appendix containing recommendations for further reading. No data was used in this paper.

RESULTS

It is thought that clinicians have gravitated towards a strengthening and structural-based approach to treating shoulder pain due to the success of conservative treatment and the typical presentation of decreased strength and range of motion in RCRSP patients. While this approach appears to be sensible at face value, it has been called into question due to the incongruency between clinical outcomes and mechanical improvements in shoulder function.

Many patients with RCRSP who undergo strength training interventions experience decreased pain and increased function despite showing only minor to moderate improvements in their strength, and negligible changes in their mechanics and activation patterns. The authors suggest these clinical phenomena should challenge our understanding of the relationship between shoulder strength, shoulder function, and pain.

The ideas put forth in this viewpoint are consistent with research on scapular mechanics, as altering the scapulohumeral rhythm or seeking visual scapulothoracic symmetry has not been shown to be necessary for improving pain and function (5). Clinicians should adopt a more modernized approach to understanding how interventions affect patients, including the consideration of biopsychosocial factors, painrelated self-efficacy, and a potential re-evaluation by the patient of the severity of their pain and its impact on their quality of life.

Exercise should be used as a conduit to assist patients in resuming meaningful activity and reach their goals, however the method by which we measure its effectiveness might need to be reconsidered.

LIMITATIONS

All viewpoint and opinion papers have an inherent limitation in that they are not datadriven research. Viewpoints nonetheless are a valuable contribution to the body of research, and reputable journals such as the Journal of Orthopedic & Sports Physical Therapy and British Journal of Sports Medicine routinely champion them.

Regardless, viewpoints fall in the lowest tier of the evidence hierarchy. Viewpoints that are published in reputable journals and have undergone a peer review process should be used as an adjunct to an evidence-informed working knowledge. They offer a means to reach beyond the current base of evidence to direct future research, question commonly held beliefs, and spark productive dialogue.

CLINICAL IMPLICATIONS

The primary clinical takeaway from this viewpoint is to not over-simplify the mechanism of action of improvement for RCRSP patients. Clinicians should continue to use therapeutic exercise, and more specifically resistance training for the treatment RCRSP, however they would be remiss to believe that 'strengthening' was the only mechanism of improvement for their patients.

Exercises should be chosen in a manner that helps patients reduce the burden of their decreased shoulder function and resume meaningful activities. The ideas in this viewpoint run parallel to emergent research on low back pain, as core stabilization and strengthening has come into question as a primary means of improving markers of pain and disability (6).

Clinicians should be motivated to look beyond a structural view of their patients and adopt a biopsychosocial method of reasoning. This viewpoint, along with a large body of research over the past two decades, serves an important role in creating dialogue regarding how patients achieve positive clinical outcomes. Despite the biological plausibility behind taking a classical recipe-based approach to prescribing therapeutic exercise, there are many factors that influence patient outcomes.

In addition to therapeutic exercise, physical therapists should be considering how debilitating and impactful upper extremity pain can be to their patients' quality of life, and how they can structure therapeutic interventions to help them improve their confidence, self-efficacy, independence, and function.

+ STUDY REFERENCE



Dr Teddy Willsey

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DIAGNOSTIC ACCURACY OF CLINICAL TESTS ASSESSING LIGAMENTOUS INJURY OF THE ANKLE SYNDESMOSIS: A SYSTEMATIC REVIEW WITH META-ANALYSIS

By Dr Michael Reiman

- 1. Despite many reported clinical tests for ankle syndesmosis injury (n=13), the clinical utility of such tests is quite limited.
- 2. No individual test can both rule in and rule out an ankle syndesmosis injury. Therefore, the authors propose test clustering for ruling out (palpation and dorsiflexion lunge test) and ruling in (squeeze test).
- 3. Caution in interpreting these findings and suggestions (including use of the proposed algorithm) is strongly warranted as their clinical utility is quite limited.

BACKGROUND AND OBJECTIVE

Ankle sprains are among the most common injuries in physically active individuals. High ankle sprains (syndesmosis injuries) typically involve prolonged recovery (1), with time to return to sport being at least twice that after an isolated lateral ligament sprain (2).

Early diagnosis of ankle syndesmosis injuries is important for most appropriate care determination. Arthroscopic surgery is the gold standard for diagnosing this injury (3), but is invasive. Consensus guidelines recommend a variety of clinical tests, but the clinical utility of these tests is not clear. This paper sought to review the diagnostic accuracy of available tests.

METHODS

This paper was a systematic review searching three databases from inception to February 12, 2021. Studies comparing various clinical measures to arthroscopy, magnetic resonance imaging, or ultrasound were considered eligible. Meta-analysis was based on random effect modelling.

Don't put an over-reliance on special tests, or any single test in isolation. Early diagnosis of ankle syndesmosis injuries is important for most appropriate care determination.



Exclusion criteria: fractures or bony avulsions, surgical stress tests delivered under anaesthesia, stress x-ray, studies with insufficient information to compute 2x2 contingency table to calculate sensitivity (SN) and specificity (SP), cadaveric studies, case series, and systematic reviews.

The clinical utility of tests undergoing metaanalysis was considered using Bayesian probability (the authors calculated pre to posttest probability shifts). The authors developed a clinical algorithm using tests with a minimum of 75% SN or 70% SP (4), with a preference to pooled summary statistics over individual study findings.

FIGURE 1 - PROPOSED CLINICAL ALGORITHM



RESULTS

- 6 studies (4 prospective, 2 case-controlled) were included with data available from 512 participants.
- Reference standard comparators included either arthroscopy, magnetic resonance imaging, or ultrasound. Various interpretations were utilized for a positive finding across the reference standards.
- 4 studies qualified for meta-analysis.
- 13 clinical tests were included: squeeze test, external rotation test, cotton test, cross-leg test, anterior drawer, tenderness of various

ligaments, tenderness of proximal fibula, syndesmotic tenderness, fibula translation and dorsiflexion lunge test.

- The median prevalence of syndesmosis injury in eligible studies for meta-analysis was 20%.
- No individual test was associated with both high SN and high SP.
- Tests with the highest SN were palpation (SN 92%) and dorsiflexion lunge (SN 75%).
- Tests with the highest SP were squeeze test (SP 85%) and external rotation (SP 78%).
- The authors proposed an algorithmic clinical examination approach (see Figure 1).

LIMITATIONS

This was an update of an older review (5), and there were still only 6 studies. In this review there were only two authors. While this is not unheard of, it is typically good to have a few more authors for things such as independent data pull, verification of data pull, independent and verification of search strategy, etc.

A couple of statistical concerns that the authors do bring up:

- They had to use a univariate model due to the small number of studies. A meta-analysis of diagnostic tests often favors bivariate modelling, as it helps to control positivity thresholds.
- Data pooling was often associated with high statistical heterogeneity, requiring use of random-effects models. This is not unusual in diagnostic reviews that often have wide confidence intervals.

Considering all of the above, I find it interesting the authors felt the need to develop an algorithm, especially based on SN and SP values that are less than impressive.

CLINICAL IMPLICATIONS

This paper sends a similar message as many other systematic reviews/meta-analyses for other regions of the body. Namely, special tests are not very special. It would have been nice if the authors detailed this a bit more in the discussion and would have provided a bit more context to their algorithm. A person skimming the article could likely focus on the algorithm and not appreciate the context of its limitations.

Will I use the algorithm as it is? Not likely. Will I use it in the context of the situation and patient in front of me? Quite possibly. A great discussion here would have provided context of mechanism of injury (unfortunately this is often times unknown), pain location, weight-bearing status, other subjective and objective presentation besides special tests, and so on. In other words, don't put an over-reliance on special tests. I would say this goes for any region of the body as well.

Examining the proposed algorithm, it may seem appropriate to utilize palpation early in your examination. It is less provocative. A couple things to consider though are: 1) is the tenderness representative of the injury or concomitant sequelae?; and 2) could provocation of the tender tissue bias the rest OF your exam, potentially leading to false positive findings?

The dorsiflexion lunge test is advocated as another screening measure. Examining the statistics of this test a bit closer we see only two studies examining it and a pooled SN of 75% with fairly wide confidence intervals (64 to 84%).

I personally think the take home of this paper is that there continues to be a need for better studies examining the clinical utility of these tests. I therefore suggest (as with all regions of the body) that a comprehensive examination approach encompassing a holistic, biopsychosocial assessment is warranted to best understand these injuries and how they affect the individual in front of you.

+ **STUDY REFERENCE**

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EXERCISE IS MEDICINE, BUT PERHAPS NOT FOR PREVENTING LOW BACK PAIN: A RANDOMIZED TRIAL OF EXERCISE AND EDUCATION TO PREVENT LOW BACK PAIN RECURRENCE

By Dr Sandy Hilton

- 1. Exercise and education, compared to an educational booklet, did not result in greater reductions in recurrent low back pain (LBP).
- 2. Treatment effect estimates were imprecise due to a small sample size.
- 3. This trial challenges previous findings that claim exercise and education are effective in preventing LBP recurrence.

BACKGROUND AND OBJECTIVE

The global burden of low back pain (LBP) remains high despite decades of research and a plethora of techniques and specialized training specifically to address back pain. Since twothirds of people who experience an episode of LBP are likely to have a recurrence within a year, there is significant benefit to preventing further episodes (1).

The authors designed this study to address the limitations of previous trials that showed reduced risk of LBP with exercise (2). They devised a randomized "Trial of Prevention Strategies" (TOPS) to assess the relative effectiveness of exercise and education for prevention of recurrent LBP.

METHODS

TOPS is a superiority, pragmatic, parallel-group randomized controlled trial. Participants had recovered from an episode of LBP within the previous week, had pain 20/100 or less (on VAS), and met the inclusion/exclusion criteria. Proper blinding was used for allocation and follow-up.

Participants were randomized to: 1) exercise and education; or 2) a control group educated via a booklet. Follow-up data and analysis

Participants in the exercise and education group had a higher expectation of a positive outcome. Two-thirds of people who experience an episode of low back pain are likely to have a recurrence within a year.

was conducted by researchers blinded to the treatment group.

The exercise group focused on cardiovascular, flexibility, resistance, and neuromuscular exercises of 8 sessions over 8 weeks with an additional home exercise program done at least twice a week. Education included anatomy, kinesiology, risk factors, and the need for physical activity. The educational booklet group received the "Managing Back Pain" booklet (3). The primary outcome examined was time to recurrence of an episode of LBP in days.

RESULTS

111 participants entered the study. The authors stopped recruitment before the established sample size was reached due to "difficulties with recruitment and exhausted funding". Demographics between groups were similar.

Participants in the exercise and education group had significantly higher expectancy of a positive outcome compared to the educational booklet group, and were significantly more satisfied with treatment (77.5% versus 25.6%). The recurrence of pain in the exercise and education group was 1.39 per person-year. The recurrence in the educational booklet group was 1.28 per person-year. There was no statistically significant difference in time to recurrence of an episode of LBP between groups.

LIMITATIONS

- The statistical power of this study was less than intended, which means that the estimated outcome strength was less than intended.
- Adherence to the exercise program was low. The authors reported this to be consistent with general population adherence rates to exercise.

CLINICAL IMPLICATIONS

This study differs from previous claims that education and exercise combined are more beneficial than either alone. The exercise regimen met the American College of Sports Medicine (ACSM) recommendations for comprehensive exercise. But what does this mean for clinical care?

Despite the inability to prevent recurrent back pain with exercise alone, education alone, or exercise and education combined, the effort remains important. A significant point in this study is that participants in the exercise and education group had a higher expectation of a positive outcome. Perhaps over a longer period of time, or with a higher level of power there would be a larger between-group difference.

Another way to look at this study is - if LBP is likely to recur no matter what we do, then isn't exercise for cardiovascular health, flexibility, strength, and coordination worth doing anyway?

Finally, this study does not say "stop using education or exercise with your patients", but it does lead to more questions. What will it take to finally decrease the global burden of LBP? Persistence, patience, and definitely more research!

+ STUDY REFERENCE



Dr Sandy Hilton

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QUADRICEPS STRENGTH INFLUENCES PATIENT FUNCTION MORE THAN SINGLE LEG FORWARD HOP DURING LATE-STAGE ACL REHABILITATION

By Dr Jarred Boyd

- 1. Isolated quadriceps capacity, as indicated by limb symmetry index (LSI) and peak torque, appear to demonstrate a larger association with International Knee Documentation Committee (IKDC) scores as opposed to single leg hop symmetry and performance.
- 2. Single leg hop testing may not reflect authentic quadriceps restoration as higher LSI values may be acquired via compensatory kinematics.
- 3. Implementation of unilateral performance criteria within the battery of return to sport testing may provide critical insight into whether the quadriceps remain a rate limiter.

BACKGROUND AND OBJECTIVE

The high recurrence of anterior cruciate ligament (ACL) tears and low rates of returning to prior level of sporting performance continues to be a pervasive issue plaguing the rehabilitation world (1).

The implementation of both subjective and objective measures may provide critical information on functional restoration and further investigation into potential causal factors for the observed outcomes. Without establishing relationships, the outcomes for ACL reconstruction (ACLR) may continue to be hampered as deficits in specific capacities and competencies are left undetected by compensatory kinematic solutions, kinetic redistribution and psychological constrains (2).

The primary aim of this study was to investigate the relationship between quadriceps strength and single leg forward hop, symmetry and unilateral performance, with an athlete's subjective report of function as indicated by the International Knee Documentation Committee Subjective Knee Form (IKDC). Exploring the performance tests that posed the most significant challenge was also examined.

It may be prudent to allocate concerted attention on isolated restoration of quadriceps strength. The high recurrence of ACL tears and low rates of returning to prior level of sporting performance continues to be a pervasive issue.



This study was a cross-sectional design, i.e. data was obtained from a specific population at a distinct point in time, in this case during latestage ACLR rehabilitation. Participants consisted of 48 physically active 14-25 year old ACLR patients who were at least 5 months post-surgery.

Isometric quadriceps testing, single leg forward hop testing and finally the completion of the IKDC, a subjective outcome measure, was administered respectively to each participant. Quadriceps strength was evaluated isometrically via an electromechanical dynamometer with the use of visual feedback. Two trials of maximal quadriceps isometric contractions were performed and averaged relative to body mass, reflecting unilateral performance; while LSI was calculated by dividing the involved limb by the uninvolved limb, reflecting symmetry. For the single leg forward hop, LSI was calculated in addition to unilateral performance, which was normalized to height.

TABLE 1 - CLINICAL TESTS AND PERCENT OF PARTICIPANTS THAT ACHIEVED CLINICAL THRESHOLDS DURING LATE STAGES OF ACL REHABILITATION

Clinical Test	Pass Criteria	Percent that Met Criteria	Percent that Did Not Meet Criteria
IKDC	≥ 90%	50%	50%
Quadriceps LSI	≥ 90%	41.7%	58.3%
Quadriceps Peak Torque (Nm/kg)- involved limb	\geq 3.0 Nm/kg	37.5%	62.5%
Single Leg Forward Hop LSI	≥ 90%	64.6%	35.4%
Single Leg Forward Hop (normalized to height)- involved limb	\geq 80% height females, \geq 90% height males	45.8%	54.2%
Quadriceps- Symmetrical and Strong	LSI \geq 90% and involved limb \geq 3.0 Nm/kg	29.2%	70.8%
Single Leg Forward Hop- Symmetrical and Good Performance	LSI \ge 90% and involved limb \ge 80% height females, 90% height males	39.6%	60.4%

IKDC = International Knee Documentation Committee Subjective Knee Form; LSI = limb symmetry index

RESULTS

Unsurprisingly, the surgical limb revealed poorer capacity during isolated testing of quadriceps isometric peak torque, as well as integrated testing of quadriceps via single leg forward hop for distance. When considering LSI specifically, peak quadriceps torque measures (85.5%) were much lower than single leg forward hop measures (92.7%). This corroborates with the findings revealing isolated quadriceps capacity (peak torque and LSI) were the most challenging criteria for participants to achieve at 37.5% and 41.7% respectively (see Table 1).

Regarding the variables most closely associated with IKDC scores, quadriceps LSI proved the strongest relationship at 31%, with an additional 8% influenced by quadriceps peak torque. Ultimately, quadriceps symmetry appeared to hold the strongest predictive value of IKDC, highlighting the importance of not only ensuring restoration of quadriceps capacity from a maximal muscle strength perspective, but symmetrical output as well.

LIMITATIONS

- Cross-sectional designs, by nature, are unable to establish casual inferences, instead capturing potential associations amongst each variable.
- This study had exclusion criteria of bilateral knee injury, prior knee surgery, ACL revision

and concomitant ligamentous injury and repair. Therefore, the findings are unable to be extrapolated to individuals with these presentations.

- The graft selected to reconstruct the ACL has been shown to impact the functional capacity of the quadriceps and hamstrings, a variable which was not controlled for in this study.
- The inclusion of LSI as a benchmark for functional preparedness can yield false inferences. The overestimation of LSI may be due to a decrease in strength of the unaffected side, which may result in symmetrical yet insufficient performance outputs.

CLINICAL IMPLICATIONS

Although cross-sectional studies do not permit one to make causal inferences, this article does incite critical thinking into the strategies employed during the ACLR reconditioning continuum via investigation of end stage capacity reacquisition, or lack thereof. The ultimate goal subsequent to any injury is to ensure an athlete possess the relevant constituents necessary for successful reintegration into competition. Objectively developing the required qualities as indicated by applicable testing increases the probability that constraints, specifically strength and the associated derivates, are resolved or at the least reduced. Failing to resolve post-surgical constraints may impede the available movement solutions an athlete can adopt, and thus ineffective strategies may perpetually arise – influencing susceptibility to future injury (3).

Objective testing appears to be a viable option to discern whether specific tissues/joints have positively adapted to the stressors of rehabilitation. This study appears to reflect that isolated quadriceps capacity and symmetry may be an essential ingredient that influences a patient's performance potential. However, often in late-stage ACLR rehabilitation priority is placed on achieving single leg hop for distance symmetry, which is often used as an inaccurate surrogate for satisfactory quadriceps strength. The ability to produce single leg forward hop symmetry, without meeting unilateral quadriceps thresholds, may be a representation of alternative strategies that preferentially incorporate the hip and ankle as more propulsive constituents (4).

Thus, appreciating the dynamic system theory perspective where movement solutions are available based off of the organism, task, and environmental constraints, it may be more prudent to allocate concerted attention on isolated restoration of quadriceps strength. This may hinder any potential ramifications from kinematically challenging or disadvantageous positions, and limit the subconscious shielding during emergent tasks. This study does not disprove the inclusion of single leg forward hop testing in a battery of performance tests, but rather it signifies the importance of establishing a more sensible hierarchy of needs in attempt to limit performance inhibitors.

+ **STUDY REFERENCE**



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ARE PLANTARFLEXOR MUSCLE IMPAIRMENTS PRESENT Among Individuals with achilles tendinopathy and do they change with exercise? A systematic review with meta-analysis

By Shruti Nambiar

- 1. Impairments in maximal plantarflexor torque and concentric plantarflexor endurance were observed on the affected side versus unaffected side.
- 2. There is conflicting evidence for impairments in plantarflexor function among individuals with Achilles tendinopathy versus healthy controls.
- 3. Improvements were seen in plantarflexor muscle endurance following a 12-week resistance training program.

BACKGROUND AND OBJECTIVE

There is a paucity of research on the presence of plantarflexor muscle impairments in individuals with Achilles tendinopathy (AT) when compared to the unaffected side and to healthy controls. The influence of progressive resistance training on plantarflexor muscle function in this population is also unclear.

The primary aim of this paper was to investigate the presence of plantarflexor muscle impairments with AT in two ways, i.e. AT versus healthy controls, and affected leg versus unaffected leg. The secondary aim was to assess the change in various parameters of plantarflexor muscle function over time among individuals with AT undergoing resistance training.

METHODS

PRISMA guidelines were followed for the reporting of this systematic review. Included studies compared muscle function between affected versus unaffected side, AT versus healthy controls, and assessed change in function over time. Measures of plantarflexor

Improvement in plantarflexor muscle function is not necessary for symptomatic improvement in those with Achilles tendinopathy. There is a paucity of research on the presence of plantarflexor muscle impairments in individuals with Achilles tendinopathy.

function included strength, power, explosive strength, and endurance.

Studies were included if participants were > 18 years of age with insertional or mid-tendon AT of any duration, and the paper had at least one measure of plantarflexor function. Studies were included irrespective of whether diagnostic methods were described or used (clinical or imaging).

Prospective studies that investigated change in plantarflexor function after any type of resistance training over time were included (resistance training duration \geq 4 weeks).

Studies that included participants with complete Achilles tear or rupture (on clinical presentation or imaging), or having undergone Achilles surgery or injection in the last 3 months, or who were diagnosed with a neurological disorder or systemic inflammatory condition were excluded.

Outcome measures included a VISA-A questionnaire or overall pain measured using VAS or NRS.

RESULTS

4/25 included studies addressed both of this paper's aims. Most of the study population had mid-portion AT with very few studies having individuals with insertional AT and a combination of both pathologies. There was a total of 524 participants (men: 353, women: 126) with a mean age of 40 +/- 7 years and BMI of 25 (range: 21 - 30). The participants had a VISA-A score of 60 +/- 15.

Diagnosis was mostly based on physical examination, or physical examination and imaging. The resistance training program for the second aim consisted of progressive isotonic loading (eccentric or concentric-eccentric protocols) ranging between 12 weeks and 6 months.

Affected versus unaffected side

- Plantarflexor torque impairments ranged between 9% and 13% (moderate evidence).
- Concentric plantarflexor endurance impairments presented on the affected side versus the unaffected side (limited evidence).
- Conflicting evidence was reported for other plantarflexor functions such as explosive strength and power.

AT versus healthy controls

- Reduced isometric plantarflexor torque (27%) was seen in one study with insertional AT versus healthy controls.
- No differences were noted in isotonic torque, power, and endurance between mid-portion AT versus healthy controls.

<u>Plantarflexor muscle function after resistance</u> <u>training</u>

- Limited to very limited evidence showed improvements in plantarflexor endurance over time following several weeks of highvolume resistance training.
- No significant improvements were seen in strength or power over time.

LIMITATIONS

- The included studies were of low quality and showed heterogeneity in diagnostic criteria.
- There is limited research on strength assessments in insertional AT causing a lack of clarity about functional impairments in this population.
- Very few studies had similar populations, interventions, and outcomes that met the inclusion criteria, therefore interfering with the meta-analysis of the data.

CLINICAL IMPLICATIONS

The findings from this paper are more relevant for individuals with mid-portion than insertional AT. This paper shows that there are side-to-side deficits in plantarflexor strength and endurance in individuals with AT. However, there is a lack of clarity on these deficits in comparison to healthy controls.

The findings highlight that all individuals with AT may not have strength impairments. The side-to-side impairments could be attributed to reduced muscle activation, apprehension, fear, or pre-existing plantarflexor impairment prior to pain presentation (1,2).

Symptomatic improvement in pain does not equate to functional improvements after the rehabilitation program, which aligns with findings in previous studies (1). This could be attributed to the heterogeneity of the impairment findings within the affected population, having sufficient plantarflexor strength at initiation, and inadequate exercise dosage or exercise adherence.

This also shows that improvement in plantarflexor muscle function is not necessary for symptomatic improvement in AT. Despite this, it is important to address impairments in plantarflexor muscle function to help enable safe return to sport.



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Shruti Nambiar

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ACTIVITY RECOMMENDATIONS AFTER TOTAL HIP AND TOTAL KNEE ARTHROPLASTY

By Anthony Teoli

- 1. A formal unsupervised activity program should be recommended to all patients recovering from total knee arthroplasty (TKA) and total hip arthroplasty (THA).
- 2. Certain patients with inadequate independent function or who require additional assistance/supervision may continue to benefit from supervised physical therapy post-TKA and THA.
- 3. Following TKA, there is no benefit to the use of continuous passive motion or cryotherapy devices. Following elective primary THA, hip precautions may not be needed in most patients.

BACKGROUND & OBJECTIVE

Total knee arthroplasty (TKA) and total hip arthroplasty (THA) are common surgical procedures. There is a lack of consensus regarding post-operative activity guidelines and rehabilitation programs for patients undergoing TKA and THA. Therefore, the authors of this article aimed to provide a review of the available literature to offer best clinical practice guidelines for activity and rehabilitation recommendations following TKA and THA.

METHODS

The authors conducted a review of the available literature on post-operative activity guidelines and rehabilitation programs. The authors also mapped out key activity interventions following TKA and THA which have been shown to provide meaningful improvements in post-operative recovery. Lastly, the authors incorporated relevant clinical practice guidelines from the American Academy of Orthopaedic Surgeons (AAOS) and the American Association of Hip and Knee Surgeons (AAHKS).

Determining the optimal exercise program for your patients should be based on rehabilitation phase, patient preferences and goals, current physical impairments, previous exercise levels, and more. There is a lack of consensus regarding post-operative activity guidelines and rehabilitation programs for patients undergoing TKA and THA.

RESULTS

Post TKA, the following interventions were recommended: unsupervised homebased exercise program, post-operative supervised physiotherapy (in-person or via telerehabilitation), pedalling modalities (e.g. stationary bike), weight/resistance training, and balance/sensorimotor training. There was no benefit found for the use of continuous passive motion or cryotherapy following TKA.

Post THA, the following interventions were recommended: unsupervised home exercise program and supervised physiotherapy for patients requiring more supervision (i.e. due to difficulty with exercise adherence, reduced functional independence and mobility, concerns for safety while performing exercises). Based on the latest available evidence, hip precautions following elective primary THA are not necessary for most patients. However, there are exceptions, including but not limited to patients with hyperflexibility syndromes, neuromuscular diseases, and dementia.

See Table 1 for a summary of the recommendations.

TABLE 1 - ACTIVITY OPTIONS AFTER TKA OR THA AND GRADES OF RECOMMENDATION

Intervention	Recommendation	Grade of Recommendation*
Recommendations after TKA		
Unsupervised home-based exercise program	For	А
Postop. supervised PT	For	В
Continuous passive motion	Against	А
Cryotherapy	Against	В
Pedaling modalities	For	В
Weight and/or resistance training	For	В
Balance and/or sensorimotor training	For	В
Recommendations after THA		
Unsupervised home-based exercise program	For	А
Postop. supervised PT	For	В
Cryotherapy	For	В
Postop. hip precautions	Against	В

*Grade A = good evidence for or against recommending intervention; Grade B = fair evidence; Grade C = poor-quality evidence

LIMITATIONS

This review of the literature has several limitations that need to be considered. Firstly, the authors did not describe how their literature review was conducted. For instance, the authors did not provide details regarding their search strategy, study selection and study exclusion. The latter may lead to biases (i.e. only articles supporting the author's bias may be presented). Furthermore, the authors did not follow a specified protocol or guideline. Consequently, the assumptions and the planning of the literature review are not known and thus, not reproducible. This makes it difficult to evaluate the quality of the review.

CLINICAL IMPLICATIONS

The authors of this study provide a wide range of clinically relevant recommendations for the postoperative rehabilitation of patients post-TKA and THA. More specific exercise recommendations are discussed below.

Please note that this list is in no way exhaustive, and that there is overlap between categories. The categories were simply used to facilitate the presentation of the recommendations.

Fundamental exercises recommended post-TKA (1,2)

- Physical activity: walking, cycling
- Mobility/strength exercises for knee flexion: supine, prone or seated knee flexion (active

or passive, with or without assistance), squats, step up/down

- Mobility/strength exercises for knee extension: quadriceps sets/arcs, straight leg raises
- Mobility/strength exercises for the ankle: ankle pumps, calf raises
- Multi-joint exercises: squats, step up/down
- **Stretching exercises:** quadriceps, hamstrings, calves, gluteals, hip flexors, hip abductors, and hip adductors

Fundamental exercises recommended post-THA (3,4)

- Physical activity: walking, cycling
- Mobility/strength exercises for the hip: active/passive/resisted hip abduction, adduction, flexion and extension; isometric buttock contractions
- Mobility/strength exercises for the knee: quadriceps sets/arcs, straight leg raises

+ STUDY REFERENCE

- Mobility/strength exercises for the ankle: ankle pumps, ankle rotations, calf raises
- Multi-joint exercises: glute bridges, squats, step up/down
- Stretching exercises: quadriceps, hamstrings, calves, gluteals, hip flexors, hip abductors, and hip adductors

It is important to note that there is currently a lack of consensus regarding the best combination of post-operative rehabilitation interventions post TKA and THA with respect to the type, setting, frequency, intensity, and duration of physical activity and exercise therapy. That being said, determining the optimal exercise and physical activity parameters for your patients post-TKA and THA should be based on factors such as post-operative rehabilitation phase, the patient's preferences and goals, the patient's current physical impairments and limitations, the patient's previous exercise/physical activity levels, among other factors.



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THE IMPACT OF A SACROILIAC JOINT BELT on function and pain using the active straight leg raise in pregnancy-related pelvic girdle pain

By Dr Sarah Haag

- 1. Pregnancy-related pelvic girdle pain (PGP) is very common.
- 2. Sacroiliac joint (SIJ) belt application improved ASLR scores and reports of pain.
- 3. SIJ belts may be used clinically to help address pregnancy-related PGP.

BACKGROUND AND OBJECTIVE

Pelvic girdle pain (PGP) is prevalent during pregnancy, yet the etiology of PGP is not fully understood. PGP during pregnancy can lead to functional disability that persists beyond pregnancy (1). While the pelvis is inherently stable due to "form closure" and "force closure", it is proposed that biomechanical changes due to pregnancy may explain the presence of pregnancy-related PGP.

The active straight leg raise (ASLR) test is a functional test to assess load transfer function in the pelvis. The purpose of this study was to determine if the use of a sacroiliac joint (SIJ) belt immediately improved ASLR score.

METHODS

Participants were recruited from an outpatient physical medicine and rehabilitation clinic. Participants were women in their second and third trimesters of pregnancy with symptoms of posterior PGP. Participants with positive P4 (Posterior Pelvic Pain Provocation) and FABER

The assumption that pelvic instability is the cause of pelvic girdle pain has led to the regular use of core stability exercises.



test, and ASLR scores between 2-10 were included. The 'Serola' SIJ belt was used for this study.

Demographics, past medical history, obstetric health questionnaire, pain diagram, numerical rating scale (NRS) for the last 24 hours and the last week, and the pelvic girdle pain questionnaire (PGQ) were all recorded. Participants wore the SIJ belt for 4 weeks during daily activities and returned to the clinic for follow-up assessment. Participants also reported any use of other pain therapies during the 4-week intervention, such as physical therapy, analgesic medications, cryotherapy, or thermotherapy.

RESULTS

84% of the subjects participated in some physical activity and 59% reported receiving at least one additional pain modality. Participants wore the SIJ belt for an average of 4 hours per day. The

FIGURE 1 - CHANGE IN ASLR SCORE BY VISIT AND BELT STATUS



ASLR score improved immediately for the belted group, but there was a significant improvement in both belted and unbelted ASLR scores at four weeks (see Figure 1).

There was a direct association between ASLR scores and NRS scores at all points in time. PGQ disability scores improved significantly over the four weeks, but the improvement did not depend on ASLR score or belt status.

LIMITATIONS

 One limitation of this study is sampling bias.
 Participants were referred to the study based on presenting to a physician with a complaint of significant PGP. Another limitation is the use of the SIJ belt as the only therapeutic option for pregnancyrelated PGP. Data was collected on other pain modalities, but there was no comparison to any therapy without the belt.

CLINICAL IMPLICATIONS

Pelvic girdle pain impacts about 45% of pregnant women and 25% of all women post-partum (1). SIJ belts are commonly used in the clinic to address pregnancy-related PGP. However, evidence supporting the use of belts to improve pain or function is not strong. Clinical guidelines suggest belts should be considered, but the overall evidence is conflicting (2). Pain and reduced function are two issues that arise from PGP, but it is also associated with reduced Health-Related Quality of Life (HRQoL) scores (3). Despite the clear negative impact of PGP on women, there are still no clear answers regarding the best intervention to treat women suffering from PGP.

The assumption that pelvic instability is the cause of PGP has led to the regular use of core and pelvic stability exercises, with or without the addition of an SIJ belt. The use of core stability exercises has not been substantiated in the evidence, and the transverse abdominal muscle (TrA) was found to be overactive in women with PGP (4). With no strong evidence for any particular exercise approach, general exercise was found to be more beneficial than no exercise (2).

On the whole, this study indicates that clinicians can consider the use of SIJ belts for women experiencing PGP during pregnancy, with the understanding that the current evidence base on belts is not strong.

+ **STUDY REFERENCE**

<u>Fitzgerald C, Bennis S, Marcotte M, Shannon M, Iqba S & Adams W (2021) The Impact of a</u> <u>Sacroiliac Joint Belt on Function and Pain using the Active Straight Leg Raise in Pregnancy-</u> <u>Related Pelvic Girdle Pain. *PM&R*.</u>



Dr Sarah Haag

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