AN AUDIT TO ASSESS THE USE OF A CLINICAL PILATES PROGRAMME FOR TREATMENT OF LOW BACK PAIN

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Compliance with ethical standards: Ethical approval was not needed for this research because all patients remain anonymous with no identifiable factors.

ORIGINAL ARTICLE

Patient Reported Evaluation of a Clinical Pilates Programme for Low Back Pain

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ABSTRACT

INTRODUCTION: Low back pain is very common, affecting a majority of the population at some point in their lifetime. This report evaluates a patient tailored Pilates programme and its efficacy.

OBJECTIVES: To evaluate the efficacy of a clinical Pilates programme with regard to pain, flexibility and functional outcomes.

METHODS: Patients with LBP were carefully selected based on functional fitness and a tolerable pain level. They were screened for any exclusion criteria. Patients underwent a 6-week clinical Pilates programme, with exercises tailored to their specific needs.

RESULTS: Primary outcome was change in the pain severity. In 30 patients referred to the 6-week programme, there was a reported average reduction of 61.5% in pain, with increases of 113.5% in flexibility and 85.89% in function.

CONCLUSION: Amongst patients with LBP, a personalised clinical Pilates programme is effective in reducing pain whilst improving flexibility and functional ability.

Low back pain (LBP) is one of the leading causes of disability worldwide[(1)], with lifetime prevalence estimates surpassing 50%[(2)]. Current treatment guidelines vary, with NICE listing a range of potential options; non-invasive non-pharmacological such as self-management, exercise, manual therapy etc. or pharmacological prescriptions. Non-surgical and surgical interventions are also listed, providing an immense variety of treatment options to physicians[(3)].

A recent emphasis has been placed on physical rehabilitation for patients with acute on chronic LBP, with one subset of this treatment category including Pilates. Pilates was developed in the early 20th century by Joseph Pilates, as a series of physical and psychological conditioning exercises.

This study observed the efficacy of a clinical Pilates based programme for LBP. With primary aim looking at pain reduction. Secondary outcomes included improvement in flexibility and function, and some qualitative data was also gathered surrounding patient feedback in relation to the programme.

OBJECTIVES

To evaluate the efficacy of a Pilates programme with regard to function, pain and flexibility outcomes.

METHODS

Study Design

Patients with LBP were carefully selected and referred by a Consultant Spinal Surgeon to the physiotherapy department at Vale Hospital, where a Chartered Physiotherapist specialising in muscle imbalance and spinal rehabilitation led the programme. The programme was based upon established stability techniques, building on research carried out by the Australian Physiotherapy & Pilates Institute (APPI).
Eligibility requirements were that the participants pain be tolerable in order to engage with the programme and that they possess the basic functional fitness to take part; this was defined as the ability to sit and stand up off an exercise mat independently.
Exclusion criteria included; osteoporosis, unstable cardiac conditions, restrictive lung conditions, pregnancy, worsening neurological symptoms.
Exercises were tailored specifically to patient's needs. A list of the exercises is included in the appendix.

Outcome Assessment

Before engagement in the programme all participants completed a PAR-Q & YOU form to ensure they were fit to take part in the class. Participants also filled out a 'Pilates Class Evaluation Form', forming a basis for measuring outcomes. Outcomes were assessed at 6-week follow up, on completion of the programme. The primary outcome was the numeric pain rating of LBP severity (range, 0-10) with a higher score indicating greater pain. Secondary outcomes included: range of flexibility (range, 0-10) – patients were asked to answer this in terms of 'their normal range of flexibility', with a higher score indicating greater flexibility. Change in function (range, 0-10) – reported as an improvement (if any) in activities they could perform post 6-week programme, with a higher score indicating greater functional ability. Qualitative data was also gathered in terms of patient feedback on the programme, and a rating was given to the overall quality of the programme (range, 0-10).

RESULTS

Pain Outcomes

28 out of 30 patients reported an improvement in pain post the Pilates programme. Average pain before the programme was recorded as mean M= 6.23 (95% CI 5.26 to 7.21), whilst pain post 6-week programme was M=2.4 (95% CI 1.95 to 2.85). This gave a 61.5% average reduction in pain.

Flexibility Outcomes

28 out of 30 patients reported an improvement in flexibility. Average flexibility before the programme was rated as M= 3.45 (95% CI 2.54 to 4.36), with the rating improving to M=7.37 (95% CI 6.72 to 8.02). There was a 113.5% average increase in flexibility.

Function Outcomes

27 out of 30 patients reported improved function. Average function was scored as M=4.13 (95% CI 3.36 to 4.90) prior to the programme. Post 6-week programme the average function

was reported as M=7.68 (95% CI 7.01 to 8.36). Hence there was an 85.89% average increase in reported function.

Programme Feedback

Patient sentiment regarding the programme was overwhelmingly positive, with many highlighting that the improvements to their pain and function were life-changing.

Error-Bar Chart

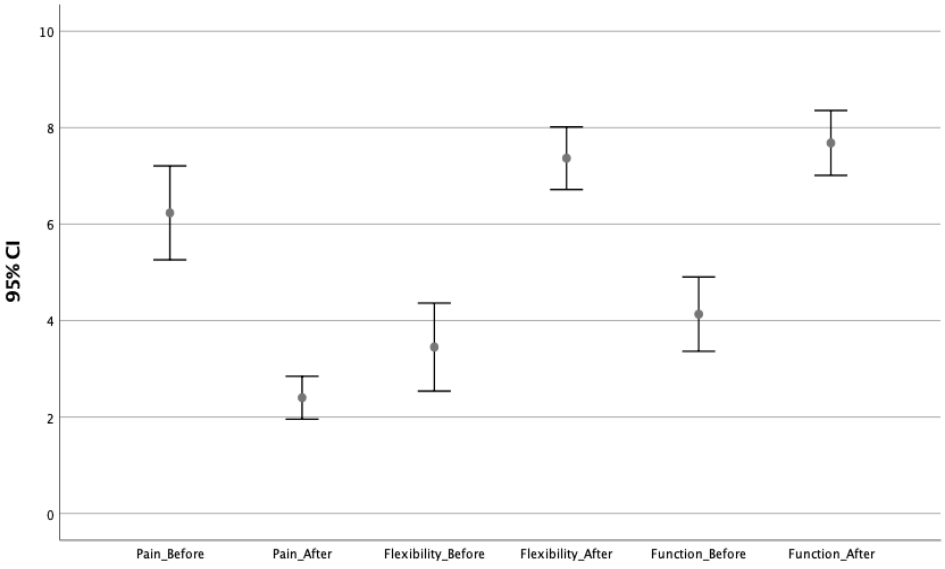

Table indicating significant changes before and post implementation of the Pilates programme.

One-Sample Test

	Test Value = 0					
	t	df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference	
					Lower	Upper
Pain_Before	13.087	29	.000	6.23333	5.2592	7.2075
Pain_After	11.029	29	.000	2.40000	1.9549	2.8451

The Sig. (2 – tailed) denotes the p- value as 0.000 which is <0.005, hence we can reject the null hypothesis as this is a significant result – the findings were not a product of chance.

DISCUSSION

This small study shows that a patient specific, tailored clinical Pilates programme results in a statistically significant improvement in pain, flexibility and function. A review of the recent literature shows several randomised controlled trials that suggest Pilates is effective at reducing pain and improving functional ability in patients with chronic LBP[4-6]. All trials displayed common themes; small sample sizes and short-term studies – similar to our own. Systematic reviews presented similar findings – the efficacy of Pilates as treatment (in comparison to minimal intervention) has been shown in a multitude of papers, however the quality of evidence is low[7-9].

Bhadauria and Gurudut (2017) found that Pilates played a key role in reducing disability, and this was echoed by Hasanpour-Dehkordi et al. (2017) who stated that general health of participants in the Pilates trial improved[4, 5]. Older literature comparing Pilates to minimal intervention included 4 good quality studies, evaluating pain before and after intervention and showing statistically significant reduction in pain[10-13]. Natour et al. (2015) found P-values <0.001 with regard to pain and function, however, although similar results were seen in Miyamoto et al. (2013) study, they found that the differences pre and post intervention were no longer statistically significant at 6 months[12, 13]. Importantly, Natour et al. (2015) reported the Pilates method having no harmful effects on patients[13]. Gladwell et al. (2006) also found that significant decrease in pain was most obvious immediately post intervention[11].

Similarly, a study conducted by Patti et al. (2016) showed reduction in ODI scores and improved posturography, reiterated by Fonseca et al. (2009) stating 'increased vertical ground reaction force' observed post 15 sessions of Pilates[6, 14].

Hayden et al. (2005) found that patient specific tailored Pilates may improve pain and function, and argued that patient adherence is necessary for optimal results, quoting 20 hours as the minimum required training period[15]. A number of studies, including our own, evaluated Pilates programmes over a 6-week period, and these were successful in showing a reduction in pain, with improved functionality[4, 5, 11]. A recent study by Wells et al. (2014) suggested implementation is necessary over a 3-6 month basis to provide optimal, longer lasting results[16]. Hence this echoes the suggestion of Hayden et al. (2005) - that a minimum training period would be beneficial in securing optimal results. Whether this period should be 20 hours or less/more requires further validation and analysis.

Alongside the notion of a 'minimum training period', Miyamoto et al. (2013) made an important observation stating that the frequency and intensity of exercises needs to be better explored[12]. This is difficult data to gather as studies in the last 5 years have shown that clinical Pilates is most effective when patient tailored. However, if data can be collected to show specific exercises targeting improvement in precise areas, then perhaps we can gain a greater understanding into how best to utilise Pilates as a method for cLBP treatment.

A study by Pereira et al. (2011) suggested that no significant difference was found between Pilates and lumbar stabilisation exercises, a similar theme underlined in other studies[4, 17, 18]. However, Pereira et al. (2011) highlighted how both interventions encompassed similar methodologies – prompting a need for closer investigation into which specific aspects both interventions (Pilates and lumbar stabilisation respectively) target and how this translates to improved outcomes for patients with cLBP[17]. However, it must be noted that the systematic review of Pereira et al. (2011) also lacked long-term data – a common theme echoed throughout this discussion.

Furthermore, there is significant ambiguity regarding a concrete definition for what can be considered a clinically important reduction in low back pain[19]. The majority of the studies mentioned in this discussion look at patient perceived pain levels, and their views on functional ability. Whilst inherently important to consider the patient's views, the subjectivity of self-reported pain and function levels needs to be adjusted to provide a uniform platform off which improved analysis might be possible[1].

The consensus throughout these studies is clearly suggestive of the key role physical therapy plays in the treatment of chronic non-specific low back pain. Pilates has been singled out to be an excellent option which has shown promising results over the last two decades of studies – albeit low quality evidence. Throughout these studies and including our own, the existence of clinical heterogeneity must also be taken into account, as meta-analyses of these results may lead to misleading information. Higher quality evidence with longer term follow up is necessary to determine whether patient tailored Pilates does indeed play an effective role in treatment of cLBP.

LIMITATIONS

The limitations of our study included; a small sample size, lack of control group and a single follow up survey. Furthermore, non-specific chronic back pain is difficult to evaluate due to its multifactorial origins. Suitable assessment of pain is required, and this can be done via the use of certified instruments.

FUTURE PLAN

Future studies will include prospective analysis, using tools such as; VAS, ODI, EQ-5D, GAD-7, PHQ-9 and greater numbers in the sample size. Data can then be re-audited and evaluated to see if any meaningful inferences can be made.

CONCLUSION

Amongst patients with cLBP, a patient specific Pilates programme resulted in statistically significant improvement in pain, alongside improved function and flexibility. Prospective analysis of future studies, with higher quality evidence, will provide more conclusive answers regarding the role of clinical Pilates as a mainstay treatment for cLBP.

[1] Whilst ODI scores and similar tools allow us to gather the information we require, patient subjectivity may still influence these results.

Table of Current Evidence for Pilates

Author & Year	Title	Summary
Bhadauria and Gurudut 2017	Comparative effectiveness of lumbar stabilization, dynamic strengthening, and Pilates on chronic low back pain: randomized clinical trial	Comparison of lumbar stabilisation, Pilates and dynamic strengthening. Reduction of pain and increased functional abilities seen in all 3 groups – Pilates showed greater reduction in disability. Short study, small sample size, assessed over a short period of time (3 weeks), needs follow up for long term outcome measurement
Hasanpour-Dehkordi et al. 2017	A Comparison of the Effects of Pilates and McKenzie Training on Pain and General Health in Men with Chronic Low Back Pain: A Randomized Trial	Comparison of Pilates and McKenzie training, with no significant difference found between the two. Both successful in reducing pain but Pilates played greater role in improving general health. Small sample size, only males included.
Patti et al. 2016	Pain Perception and Stabilometric Parameters in People With Chronic Low Back Pain After a Pilates Exercise Program	Pilates programme showed improvement in pain and posture. Small sample size, needs follow up for long term appraisal
Lin et al. 2016	Effects of pilates on patients with chronic non-specific low back pain: a systematic review	Pilates showed significant improvement in both functional ability and pain relief.
Patti et al. 2015	Effects of Pilates Exercise Programs in People With Chronic Low Back Pain	Pilates has been seen to be more effective than minimal physical intervention.
Yamato et al. 2016	Pilates for low back pain	Low to moderate quality evidence that Pilates is more useful than minimal intervention.
Rydeard et al. 2006	Pilates-Based Therapeutic Exercise: Effect on Subjects With Nonspecific Chronic Low Back Pain and Functional Disability: A Randomized Controlled Trial	Specific exercise group showed significantly lower levels of pain and functional disability, maintained over a 12-month period. PEDro score 8/10
Gladwell et al. 2006	Does a Program of Pilates Improve Chronic Non-Specific Low Back Pain?	Pilates improves pain severity, function health, general well-being (all reported against a control group). PEDro score 6/10

Miyamoto et al. 2013	Efficacy of the Addition of Modified Pilates Exercises to a Minimal Intervention in Patients With Chronic Low Back Pain: A Randomized Controlled Trial	Addition of Pilates alongside patient education does provide some benefit; however findings were no longer statistically significant at 6 months. PEDro score 8/10
Natour et al. 2015	Pilates improves pain, function and quality of life in patients with chronic low back pain: a randomized controlled trial	No harmful effects of implementing Pilates in patients with LBP, ANOVA test showed significant results regarding pain, function and quality of life. PEDro score 8/10
Wells et al. 2014	The definition and application of Pilates exercise to treat people with chronic low back pain: a Delphi survey of Australian physical therapists.	Recommendation from 30 physical therapists that Pilates treatment should entail a 3-6 month programme over the conventional 6-weeks seen in most studies. Requires further validation.
Hayden et al. 2005	Systematic review: strategies for using exercise therapy to improve outcomes in chronic low back pain.	Data analysing exercise intervention, with a particular focus on 'dose' aka hours of intervention time – data suggesting a minimum time spent training approach, approx. 20 hours.
Pereira et al. 2011	Comparing the Pilates method with no exercise or lumbar stabilization for pain and functionality in patients with chronic low back pain: systematic review and meta-analysis	Found no significant difference between either intervention but found commonalities in both approaches.
Moon et al. 2015	Comparison of deep and superficial abdominal muscle activity between experienced Pilates and resistance exercise instructors and controls during stabilization exercise.	Pilates and resistance exercises are both used for lumbar stabilisation. Surface muscle activation was similar throughout both groups.
Fonseca et al. 2009	Laboratory Gait Analysis in Patients with Low Back Pain before and after a Pilates Intervention	Reported reduced LBP and increase in vertical ground reaction force following Pilates programme.

Reflection

This SSC gave me an insight into the current practice in the Orthopaedic Spinal specialty in Wales. It allowed me to develop my appraisal and analysis of scientific literature, whilst also learning how to use the statistical analysis programme, SPSS. I had a chance to practice clinical skills and examinations throughout my time with my tutor, putting me in good stead for future practice.

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APPENDIX

List of Exercises from the APPI which were modified and implemented on a patient specific basis seen below:

Nuffield Health
Epsom Gateway
Ashley Avenue, Epsom KT18 5AL
0303 123 1203
www.nuffieldhealth.com

Exercise 1 : Key Element 1: Breathing

Exercise 2 : Key element 3: Ribcage

Exercise 3 : Key Element 2: Centering

Exercise 4 : Key Element 4: Shoulder blades

Exercise 5 : Key Element 5: Head and neck

Exercise 6 : Rest position

Exercise 7 : Hip Twist Level 1

Exercise 8 : Hip Twist level 2

Exercise 9 : Scissors Level 1

Exercise 10 : One leg Stretch Level 2

Exercise 11 : One leg stretch with band

Exercise 12 : Overhead reach

Exercise 13 : Clam Level 1

Exercise 14 : Lower & Lift

Exercise 15 : Shoulder bridge Level 1

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Exercise 16 : Swimming Level 1

Exercise 17 : Swimming Level 2

Exercise 18 : Swimming Level 4 legs only

Exercise 19 : Swimming Level 4

Exercise 20 : Oblique preparation

Exercise 21 : Hundreds Level 1

Exercise 22 : Hundreds Level 2

Exercise 23 : Stride Hip Flexor Stretch

Exercise 24 : Lying Gluteal Stretch

Exercise 25 : The shell stretch

Exercise 26 : Neck Stretch - Upper Trapezius

Exercise 27 : Simple rises

Exercise 28 : Roll down

Exercise 29 : Toy soldier

Exercise 30 : Dumb waiter

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Exercise 31 : Shoulder shrugs

Exercise 32 : Stepping Level 2

Exercise 33 : Arm Openings Level 1

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Notes:

1- Key Element 1: Breathing

2- Key element 3: Ribcage

3- Key Element 2: Centering

4- Key Element 4: Shoulder blades

5- Key Element 5: Head and neck

6- Rest position

7- Hip Twist Level 1

8- Hip Twist level 2

9- Scissors Level 1

10- One leg Stretch Level 2

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11- One leg stretch with band

12- Overhead reach

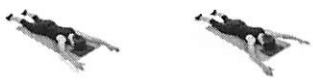
13- Clam Level 1

14- Lower & Lift

15- Shoulder bridge Level 1

16- Swimming Level 1

17- Swimming Level 2



18- Swimming Level 4 legs only

19- Swimming Level 4

20- Oblique preparation

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21- Hundreds Level 1

22- Hundreds Level 2

23- Stride Hip Flexor Stretch

24- Lying Gluteal Stretch

25- The shell stretch

26- Neck Stretch - Upper Trapezius

27- Simple rises

28- Roll down

29- Toy soldier

30- Dumb waiter

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31- Shoulder shrugs

32- Stepping Level 2

33- Arm Openings Level 1