



Effectiveness of Maitland Spinal Mobilisation Therapy in the Treatment of Non-Specific Low Back Pain - a prospective study of clients attending a single treatment centre in the Republic of Ireland

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Abstract

Background: In Ireland the use of spinal mobilisation therapy (SMT) is a relatively new field in the management of pain in acute and chronic onset of low back pain (LBP) as individuals seek alternatives to other traditional clinical treatments. The aim of this study was to examine the effectiveness of a routine four-week course of spinal mobilisation in individuals experiencing non-specific LBP in a single practice. The main outcome variable was the reduction in severity of pain post treatment.

Methods: All clients attending for spinal mobilisation therapy using the Maitland method at a single site during the period of June 2018 to November 2019 were included in the study. Each client completed a pre-screening questionnaire, including pain scores obtained through the Numeric Rating Scale (NRS-11) and underwent a four-week treatment. Post screening questionnaires were conducted following a four-week therapeutic treatment with an individual physical therapist. Data were coded and entered into SPSS version 21 for analysis. Wilcoxon signed rank tests were used to test pain scores pre and post treatment.

Results: 491 individuals had an initial consultation for LBP and 90 clients completed the recommended four-week programme. The most common symptom of LBP pain described by clients attending the clinical was sharp pain (55%), followed by aching symptoms (33.6%). The median length of LBP was 3 years and the median age was 44 years. In the 90 clients completing the four week programme a statistical significant difference was observed pre and post treatment ($p < 0.00$). 88 (97.8%) of clients indicated that they had a reduction in pain and one quarter of patients had complete elimination of pain following the four-week intervention.

Conclusions: The findings of this study indicate that manual therapy is a consideration in treatment of non-specific LBP and as an alternative to conventional treatment methods. Maintaining adherence to recommended treatment is a key challenge and may be strongly influenced by patients' expectations in recovery time and cost of treatment. Further and more in-depth research is needed to establish the success of SMT in treatment of non-specific LBP and in improving patient outcomes.

Keywords: Low back pain, Maitland method, Back injury, Spinal mobilisation therapy, Physical therapy

Introduction

Low back pain (LBP) is an unpleasant and debilitating condition of the musculoskeletal system with a lifetime prevalence

reported to be as high as 84% of the adult population [1]. It is an important public health concern as it impacts on health service utilisation and is one of the leading causes of work re-

lated absenteeism and disability in Western populations [2-4]. The growing number of people presenting with chronic low back pain, that is pain in the lower back lasting more than 12 weeks, is also increasing dramatically with increasing age [4]. A combination of problems, including physical and psychological factors attributed to LBP adds to the difficulty in diagnosis and management of the condition. Therapeutic management is thought to be most successful when the precise source of pain is identified [5]. In many cases, management of acute and chronic back pain is reliant on pain management therapy through opioid and non-opioid medication with limited high quality data on its benefits and harms [6,7].

For the management of LBP, most clinical practice guidelines are focused recommendation to stay active, education, pain management with pharmaceuticals and physiotherapy [1]. However, treatment using physical therapy or spinal mobilisation therapy (SMT) for LBP is growing in popularity. One technique of SMT developed by Mr. Geoffrey Maitland, an Australian physiotherapist in the 1960's is directed towards the spine through "hands-on" slow and passive mobilisation of the spinal joints within the patient's range of motion [8-11]. However, the exact mechanism of action remains under some discussion. The most likely explanation is that it works through biomechanical and/or neurophysiological mechanisms focused on joint movement that improves the range of motion, decreased muscle spasm and decreased pain [10]. Clinical decision making using the Maitland method is guided by both mechanical and neurophysiological considerations and the individual's response to treatment over time.

Studies have shown that early intervention using physical therapy for acute LBP reduces healthcare utilisation and reduces opioid use [8]. Recent research has shown that SMT significantly improves symptoms of LBP, including pain, mobility and functionality [12-14]. A systematic review and meta-analysis of changes in pain sensitivity following SMT found favourable effects over other interventions on increasing pressure pain thresholds [15]. However, the use of physical therapies is shown to involve various approaches and variations to treatment and results demonstrating its effectiveness in treatment of non-specific LBP remain mixed. A recent Cochrane review on the use of physical therapy or spinal mobilisation therapy (SMT) in treatment of acute LBP suggest that treatment was no more effective than other recommended therapies. However, the authors highlight the lack of quality evidence available and indicate that SMT is a safe treatment option in the management of acute LBP [16].

In Ireland, the use of SMT is a relatively new field in the management of pain in acute and chronic onset of LBP as individuals seek alternatives to other traditional clinical treatments. There is limited data on use and effectiveness of SMT treatment in an Irish context. The assessment of treatment is very important to measure specific patient outcomes following SMT. The aim of this study was to examine the effectiveness of a routine four-week course of spinal mobilisation using Mait-

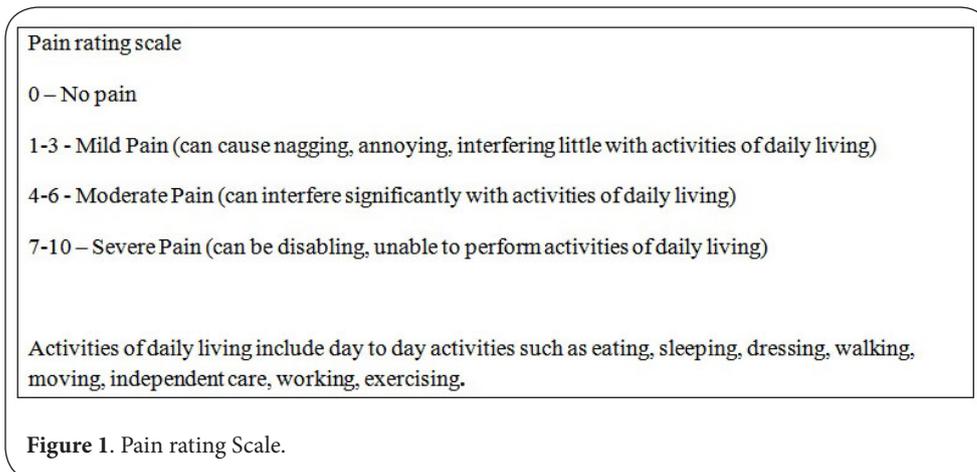
land's mobilization in individuals experiencing non-specific LBP in a single practice. The main outcome variable was the reduction in severity of pain post treatment following SMT.

Methods

A service evaluation of treatment was carried out at a single physical therapy treatment centre located in the South East Region of Ireland. All patients attending the treatment centre for LBP between June 2018 and November 2019 were included in the study. The main inclusion criteria were the presence of non-specific low back pain as the primary problem and consenting adults over the age of 18 years. Clients were excluded from the data set if they had attended the treatment centre for a primary problem not related to LBP, under the age of 18 years or had any particular history significant to bone weakening. There was no exclusion placed on gender, age, length of problem, past surgical treatment or use of medication for LBP. Each client was asked to provide written consent for use of their data for the purpose of measuring effectiveness of treatment in the management and treatment of LBP prior to treatment taking place. Data were excluded from the evaluation where consent was not obtained and treatment proceeded as normal. All clients were assessed and followed routine SMT treatment for their LBP complaint at the facility by a single physical therapist with greater than 20 years' experience.

A pre-assessment questionnaire aimed at collecting information on the location and duration of LBP, activities of daily living, use of regular medication and prior treatment was completed at the initial consultation (see [Appendix 1](#)). Participants were asked to rate the severity of their condition on a numeric pain rating scale [17] (see [Figure 1](#)). This 11-point numerical pain rating scale (NRS-11) tool is used in the measurement pain in which patients are asked to rate the intensity of their pain on a scale of 0 (no pain) to 10 (worst imaginable pain) [18]. The NRS-11 has shown good reliability and predictive validity as a measurement of pain intensity. It has also shown good responsiveness in its ability to detect changes in pain scores accurately when used in populations with conditions of LBP [17,19].

Each client underwent an initial examination procedure conducted by a single therapist trained in Maitland Orthopaedic Manual Therapy. The Maitland therapy is based on treatment of pain and stiffness. This consists of assessment of active range of motion testing and accessory range of motion testing. The client's description of pain and stiffness is also used in the overall assessment. Pain dominant terminology expressed by clients include pain, burning, throbbing and aching. Stiffness dominant terms include stiff, tight, boring, stabbing shooting, restricted and limited. Clients grade of movement (pain and stiffness) are assessed and treatment is then provided based on grading by the physical therapist. When the client is pain dominant, grade I and II are used initially. Clients exhibiting stiffness are treated at grade III and IV.



For further description of Maitland therapy see [Table 1](#).

Table 1: Grades of movement Maitland orthopaedic method.

Grade	Mobilisation
GR I	Small amplitude, short of resistance (R1). R1 is the first point in movement where resistance is perceived by the therapist.
GR II	Large amplitude, short of resistance (R2). R2 represents the limit of resistance in a range of movement
GR III	Large amplitude to 50% of R1-R2
GR IV	Small Amplitude to 50% of R1-R2

A digital posture analysis of the frontal view of each patient was conducted on the initial consultation. The treatment procedure was then tailored to suit the findings of physical examination. This consisted principally of joint mobilisation and traction for dysfunctional joints, three times per week for a continuous four-week period. The mobilisation frequency was 50% per selected mobilisation technique. Grade I and II mobilisations were used for patients who indicated significant pain. The therapist transitioned to Grade III and IV mobilisations when the pain levels reduced, and the therapist deemed them tolerable. In addition, home exercises were provided based on the findings of the physical examination and consisted of the McKenzie's extension in lying. Patients were taught this exercise by the therapist, and were asked to do ten repetitions, three times per day. Lifestyle advice was also provided on an individual basis. All treatments were

recorded in the clients notes to track progress and to ensure treatment proceeded in the correct order. A post-treatment questionnaire (see [Appendix 2](#)) was completed and clients were asked about to indicate their activities of daily living and regular medication use following the four-week Maitland SMT treatment programme. Participants were asked to rate the severity of their symptoms using the numeric pain rating scale post treatment.

Data was anonymised, coded and entered in to SPSS version 21 for analysis. Frequency and percentages were used to describe participants' demographics. The mean, median and standard deviation were used to summarise continuous data. Wilcoxon signed rank tests were used to test pain scores pre and post treatment. The statistical significance was set at the 5% level. A mixed ANOVA was used to compare mean distinctions in pre and post pain scores between groups based on age and gender.

Findings

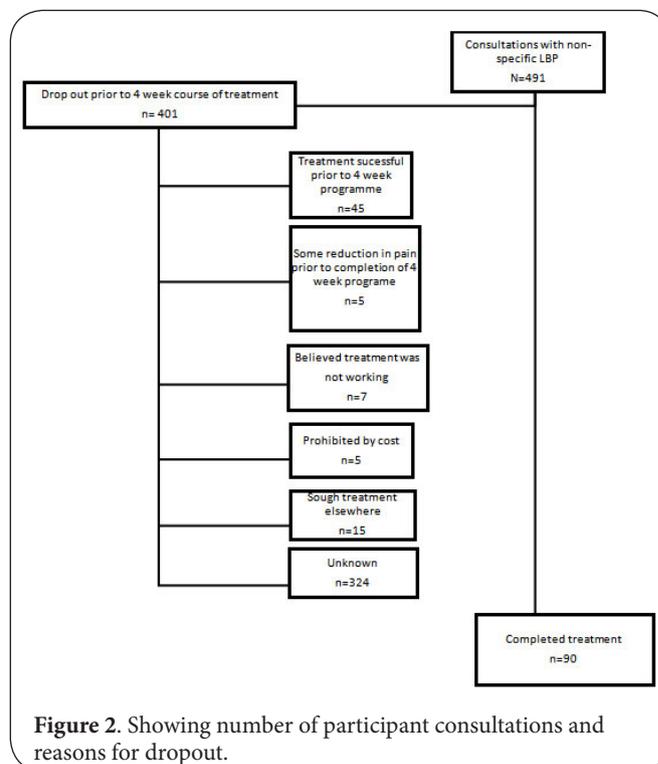
Four hundred and ninety-one individuals had an initial consultation for LBP and 90 clients completed the recommended four-week programme. Those not completing the treatment were followed up and asked to indicate their reason for dropout. 45 participants indicated treatment was fully successful prior to completion of the recommended four-week time frame and a further five had indicated some pain relief before completion of the recommended treatment work period. Seven participants believed the treatment was not working for them, while a further five indicated that the cost was prohibitive. Fifteen participants had moved to treatment elsewhere or had been referred to a medical specialist during the four-week treatment period. The remainder of participants were not contactable, failed to return the call or did not wish to indicate the reason for dropout (see [Figure 2](#)). The demographic information of all clients is illustrated in [Table 2](#). The most common symptom of non-specific LPB pain described by clients attending the clinical was sharp pain (55%), followed

Table 2: Demographic information on study participants.

Demographic information	All consultations N=491	Completed 4-week Maitland treatment programme n=90
Gender		
	Frequency (%)	
Male	246(50.1)	46(51.1)
Female	245(49.9)	44(48.9)
Age (Mean, standard deviation)	45.90(17.4)	44.9(17.5)
Age (Median)	44	43
Length of LBP complaint		
Acute onset	10 (2.1)	0
Less than 6months	222 (45.8)	35(38.8)
6-12months	60 (12.4)	11(12.2)
1-2 years	57 (11.8)	14(15.5)
3-4 years	34 (7.0)	6(6.6)
Greater than 5 years	102 (24.7)	24(26.6)
Unanswered	6	
Length of long term LBP complaint		
Median years (range)	3 (0-53)	5(0-39)
Pain in other area separate from LBP		
	Frequency (%)	
Yes	213(44.4)	53(58.8)
No	267 (55.6)	36(41.2)
Unanswered	11	1
Attended doctor in past 6 months with LPB		
Yes	217(44.3)	46(51.1)
No	271 (55.3)	44(48.9)
(Unanswered)	3	
Taking regular medication for LBP		
Yes	155 (31.8)	26(28.8)
No	322 (68.2)	64(71.2)
Unanswered	4	
Taking regular medication for conditions other than LBP		
Yes	217 (44.6)	38(42.2)
No	270 (55.7)	52(57.7)
Unanswered	4	
Symptoms of LBP pain experienced		
Sharp pain	270(55)	45(50)
Dull pain	159(32.4)	36(40)
Boring pain	32(6.5)	9(10)
Burning pain	63(12.8)	12(13.3)
Numbing	54(11.0)	10(11.1)

Continuation of Table 2.

Tingling	73(14.9)	18(20)
Achy	165(33.6)	37(41.1)
Description of LBP symptoms in the last six months		
Getting better	27(7.0)	6(6.6)
Getting worse	170(43.9)	35(38.8)
About the same	188(48.6.)	36(40)
Unanswered	106	13
Diagnostic image procedure		
Yes	178(38.9)	43(47.7)
No	280(61.1)	45(50)
Unanswered	33	2
Surgical procedure for LBP		
Yes	34 (7.4)	8()
No	423(92.6)	79(87.7)
Unanswered	34	3



by aching symptoms (33.6%). The median length of LBP was 3 years and the median age was 44 years.

In the 90 clients completing the four-week programme a Wilcoxon signed rank tests were used to test pain scores pre and post treatment. On a scale of 0-10, where 0 was indicated as no pain and 10 severe pain, an average pain score was recorded at 5.38 (range 1-10) in the pre-treatment group.

Post treatment average score was recorded as 2.14 (range 0-9). This was statistically significant at the 5% level ($p < 0.00$) (see **Table 3**). A mixed ANOVA was conducted to assess the impact of age and gender on participants' pain rating pre and post treatment. The model was found not violate the assumption of homogeneity. The main effect comparing age and gender was not statistically significant, $F(4, 79) = 1.177$, $p = 0.327$, partial eta squared 0.056) suggesting no difference in the effectiveness of treatment based on these two variables. Overall the median improvement resulting in the reduction in pain scores (based on scale of 0-10) was to the magnitude of 3 points on the pain rating scale.

A number of outcomes were measured post treatment and 88 (97.8%) of clients indicated that they had a reduction in pain and one quarter of patients had complete elimination of pain. The outcomes indicated by clients following the four-week treatment are illustrated in **Table 4**.

Discussion

The assessment of treatment outcomes is very important in evaluating the improvement in LBP using physical therapies. Results from randomised and systematic reviews on the effectiveness of spinal mobilisation therapy indicate that some individuals respond very well to physical therapy while others report little or no improvement in LPB [16,20]. Our study showed that clients completing the recommended treatment

of four weeks of Maitland's spinal mobilisation therapy were found to respond well to treatment resulting in a decrease in overall pain scores. Similarly with a randomized clinical trial comparing SMT to muscle relaxants for subacute LBP in a group of 191 participants over a two course of treatment found a reduction in pain in the group receiving mobilisation treatment in comparison to the control group [21]. However, the treatment group in this case had an onset of acute pain of two to six weeks. Similarly, a recent study comparing Maitland's postero-anterior mobilization and Mulligan's sustained natural apophyseal glide (SNAG) on pain, mobility, muscle activation and functional disability in subjects with chronic, non-specific low back pain found that both groups showed significant improvement for pain, range of motion, back extensor muscular activity and disability [22]. While clients were randomised into the two treatment groups in this study it only represents a very small sample size. However, a separate study concluded with similar findings, indicating both Maitland and Mulligan methods of SMT provided an improvement in range of motion and a reduction in pain for those with sacroiliac joint dysfunction [23].

While we found that age and gender was not shown to have any significant effect on the reduction of pain scores, greater subgroup analysis would be needed to identify specific populations that are likely to benefit from SMT, including the impact of treatment on the length of the long term problem. Women typically have a smaller sacrum joint surface area in comparison to men, resulting in a higher concentration of stresses across the joint. The sacrum is also wider with greater curvature and is tilted backward in women, which may cause problems in the sacroiliac joint [24]. Changes in hormone levels and pregnancy is also associated with increased presentation of LBP in women. There is some limited evidence to suggest the Maitland method is effective in improving pain and functionality in younger adults with chronic LBP [25]. However, increasing age is positively associated with higher level of spinal degradation and therefore younger people may respond better to treatment for physiological reasons.

In our audit, clients participating in the recommended four-week programme showed a number of improvements in quality of life indicators. Over three quarters of participants indicated an ability to perform tasks that they could not perform prior to treatment and improvements in their ability to perform exercise post treatment. This may concur with the findings of a recent systematic review and meta-analysis of the benefits and harms of SMT for treatment of chronic LPB. The authors conclude that while the quality of evidence varied suggesting that SMT does not result in clinically better effects for pain relief there appears to be better short term improvement in function compared with other treatment methods [26]. Almost half of all participants in the current study indicated a reduction in levels of stress, positive change in mood and improvements in the levels of well-being. Participants also reported less use of over the counter (OTC) pain medication

Table 3: Severity of pain score pre and post treatment.

N=90	Pre-treatment	Post-treatment	P-value (Wilcoxon signed rank)
Mean (Range)	5.38 (1-10)	2.14 (0-9)	0.00*

Table 4: Treatment outcomes.

Outcomes after four week course of treatment n=90	Frequency (%)
Reduction in pain	88 (97.8)
Complete elimination of pain	23 (25.5)
Ability to perform tasks that could not be performed prior to treatment	58 (64.4)
Reduction in use of pain medication (self-administered over the counter medicines such as paracetamol, ibuprofen etc.)	51 (56.6)
Reduction in pain medication prescribed by the GP/doctor	18 (20)
Complete elimination of pain medications	27 (30)
Ability to exercise or exercise more frequently	60 (66.6)
Reduction in stress	44 (48.9)
Positive change in mood or levels of anxiety	50 (55.5)
Levels of positive well-being	52 (57.8)

and use of prescription medication. A double-blinded randomized controlled trial in comparison with diclofenac and placebo and spinal mobilisation indicated that participants experienced better quality of life after the spinal mobilisation when compared to diclofenac [27].

There are a number of limitations in the current study. It was limited by the number of clients that did not complete the recommended treatment and therefore sub groups analysis was not conducted due to the small sample size. The analysis is also limited to a subgroup of acute non-specific LBP which may or may not have other health problems. Therefore, it is recommended that some caution is exercised in the generalisation of these results to the wider population. The therapy was conducted by a single therapist and this may have been advantageous in removing some of the variation that exists in mobilisations techniques used in spinal therapy treatment. There may be potential for responder bias in reporting of pain score pre and post treatment. While this study showed positive improvements in pain scores, it was conducted as an audit of current practice. Double-blinded, randomized-controlled, clinical trials are the recommended gold standard in measuring treatment outcomes. More detailed data collection to record the exact location of pain and its extension in the peripheries, improvements in strength, sensory changes, reflex changes, body max index and adherence to exercise is recommended in any future studies. Nonetheless, the study showed that adherence to the treatment programme over the four-week period was very successful in alleviating pain associated with non-specific LBP.

Conclusion

The findings of this audit indicate that manual therapy using the Maitland method is a consideration in treatment of LBP and as an alternative to conventional treatment methods. Maintaining adherence to recommended treatment is a key challenge and may be strongly influenced by cost of treatment [28,29]. The cost of treatment is not covered under the general medical scheme (GMS) in Ireland and clients must pay for the full course of treatment. While cost is a consideration in adherence to treatment, other factors may improve the completion of recommended treatment. Assessment of patients' knowledge and understanding of the problem and expected outcomes may improve adherence. It is well recognised that clear and effective communication between health professionals and their clients develops trust in the therapeutic relationship [28,30]. The use of spinal mobilisation as a strategy in the treatment of LBP requires further debate and study in Ireland with the inclusion of stakeholders from the medical professions.

List of abbreviations

LBP: Low back pain
SMT: Spinal mobilisation therapy
OTC: Over the Counter

Additional files

Appendix 1
Appendix 2

Competing interests

The authors declare that they have no competing interests.

Authors' contributions

Authors' contributions	AP	KP	MF
Research concept and design	✓	--	✓
Collection and/or assembly of data	✓	✓	✓
Data analysis and interpretation	✓	--	✓
Writing the article	✓	✓	✓
Critical revision of the article	--	--	✓
Final approval of article	✓	--	
Statistical analysis	--	--	✓

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