



Comparison between the Effectiveness of McKenzie Extension Exercises and William Flexion Exercises for Treatment of Acute or Sub-acute Low Back Pain

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ABSTRACT

Background: Acute low back pain is one of the leading causes of work absences throughout the world. People from low- and middle-income countries faced more low back pain compared to developed countries. This is because they work physically and prefer to use manually carrying objects by hand. One of the effective treatments for acute low back pain is exercise.

The current study aims to compare the effectiveness of the McKenzie Extension Exercise to William Flexion Exercise for patients with acute low back pain and or sub-acute low back pain in Erbil City.

Methods: Quasi-experimental comparative trial of pre-post study design was conducted. Patients were recruited from the physiotherapy department of Rzgary Teaching Hospital, Iraq from October 17th, 2021 to December 1st, 2022. The patient seeking care for acute or sub-acute low back pain visited the physiotherapy department at Rzgary teaching hospital. Eligible participants were assigned to receive management based on the McKenzie group receiving exercises according to physical examination at least Five times a day and the William group receiving exercises at least Three times a day. Primary outcome measures include pain (0-10 Numerical Rating Scale NRS) over the First week at Three-week, pain at Three months, and level of disability (0- 24 Roland Morris Disability Questionnaire RMDQ) over the First week, three weeks and at Three months treatment effect was estimated.

Result: One Hundred and Twenty participants were recruited and all of them completed the program. An Independent sample t-test was applied to compare the mean NRS score of two treatment groups before treatment and after treatment. The P-value for the independent sample t-test (0.89) shows that there is a non-significant difference in mean NRS between the two treatment groups before treatment. The P-value for the independent sample t-test (< 0.001) shows that there is a highly significant difference in mean NRS between the two treatment groups after treatment. The P-value for the independent sample t-test (0.568) shows that there is a non-significant difference in mean RMDQ between the two treatment groups before treatment. The P-value for the independent sample t-test (<0.001) shows that there is a highly significant difference in mean RMDQ between the two treatment groups after treatment.

Conclusion: In the present study it was found that McKenzie Extension Exercise produced a significant effect in managing acute and sub-acute low back pain in adult patients. Furthermore, William Flexion

Exercise has a significant impact on managing patients with acute low back pain, while, this impact is lower than McKenzie Extension Exercise.

Keywords: *Back Pain, Exercise, McKenzie Extension, William Flexion*

INTRODUCTION

Low back pain (LBP) is a pain syndrome that affects the lower back and it's a musculoskeletal condition associated with work. Muscle tension or poor posture are the two main causes of LBP. The propensity to sit, and work for extended periods with a bent posture, lifting and carry goods with an improper posture, an irregular spine, or specific conditions including degenerative diseases can all contribute to the development of LBP (Hartvigsen et al., 2018). According to a study more than 60% of people with mechanical low back pain would continue to have pain or have frequent recurrences one year after beginning (Itz et al., 2013) between 15% and 40% of persons with new-onset lumbar radiculopathy will experience persistent pain or recurrence (Hooten and Cohen, 2015). It is essential to recognize that pain differs from nociception and involves not just the activation of A delta fibers and C fibers, but also context-dependent emotional, cognitive, and behavioral components (Vlaeyen and Crombez, 2020).

A study conducted in 195 countries to assess the incidence, prevalence, and years lived with disability for 354 medical conditions discovered that low back pain was the leading cause of international reduced productivity measured in years, as well as the leading cause of years lived with disability in 126 countries (James et al., 2018). Low back pain has a pooled lifetime prevalence of 47% across low-income, lower-middle-income, and upper-middle-income nations (Morris et al., 2018). Low back pain is more common as people get older, with rates ranging from 1% to 6% in children aged 7 to 10 years, to 18% in adolescents (Hoy et al., 2012). Having a peak frequency of between 28% and 42% in adults between the ages of 40 and 69 (Hoy et al., 2012).

There are various exercises are clinically used for the management of the low backpain, but the most common are William's flexion and

McKenzie method; William Flexion Exercise (WFE) were created for men and women under the age of 50 and 40 respectively, who have excessive lumbar lordosis and whose radiographs reveal contrast in the interarticular space of the lumbar segment. By aggressively strengthening the abdominal muscles, gluteus maximus, and hamstrings and passively stretching the hip flexors and lower back muscles, this exercise regimen can relieve pain and give the lower shaft stability (Fatemia, Javida and Najafabadib, 2015).

For primary care treatment, the mechanical diagnosis and therapy (MDT) McKenzie-method is frequently utilized. The McKenzie treatment, which is the most frequently used by physiotherapists to treat LBP, This reasoning for treatment serves as the foundation for the McKenzie method, a system of classification and treatment based on classification that is widely used to treat low back pain in many nations, In the McKenzie approach, classification comes after a thorough clinical examination that looks at posture and range of motion as well as the patient's symptomatic reaction to various loading strategies used on the spine.

In contrast to other therapy approaches, this approach tries to give patients as much autonomy from the therapist as possible, enabling them to manage their pain by maintaining proper posture and engaging in exercises designed specifically for their condition. It helps patients to move the spine in a way that won't worsen their condition, preventing mobility restriction brought on by pain.

Normally in Kurdistan Region in Iraq, physician use analgesics for acute low back pain. After consulting a primary care such as acetaminophen or NSAIDs. According to recent study indicated that Muscle relaxants and painkiller such as gabapentin, topical analgesics and opioids are normally used for low back pain(Casiano, Dydyk

and Varacallo, 2020). These will have a detrimental effect on liver and other vital organs (Akbar and Zainuddin, 2020). Although not recommended in most guidelines, exercises are also commonly prescribed for this population. Mostly in physiotherapy departments in Erbil city, they performed William Flexion exercise. This exercise mostly flexion exercise (Dydyk and Sapra, 2022).

While McKenzie exercise method teach patients to perform this exercise not for strengthening of the muscle but for reliving pain, which caused by mechanical problem. This will help patients and their family to perform such exercises in the future if they feel low back pain. This study aims to find out which one McKenzie Extension Exercise (MEE) or William Flexion Exercise (WFE) is more effective for patients with acute or sub-acute low back pain (LBP). In Kurdistan Regional of Iraq there have not been done any studies to compare these two methods of exercises for this reason we conducted this particular study.

PATIENTS AND METHODS

Study Design, duration and Setting

Quasi-experimental comparative trial of pre-post study design was conducted. Patients were recruited from the physiotherapy department of Rzgary Teaching Hospital, Iraq from October 17th 2021 to December 1st 2022. Rzgary hospital is one of the teaching hospitals in Erbil city, which is general hospital for managing different kind of patients. Back pain is one of the health problems which is treated in physiotherapy department of Rzgary teaching hospital. Physiotherapy department is a differentiated department and has own staff. It has male and female exercise hall separately. Each hall has at least five physiotherapists who trained well and majority of them are graduated from medical institute physiotherapy department. Furthermore, some of them are recently graduated from college of physiotherapy. They receive different cases such as stroke, shoulder pain, knee pain, hand problems and back pain.

Sample and Sampling technique

The samples recruited in this study were 120, who were 60 males and 60 females. A none probability - convenient sampling technique was used for selection of the patients. Patients were divided into two groups. They have some matching criterion between both groups such as age, severity of pain and level of disability. First group, 30 males and 30 females received William Flexion Exercises (WFE) group A, and second group 30 males and 30 females received McKenzie extension exercises (MEE) group B. Selected patients continued the program and there were not any withdraw cases. Because the researchers worked with those patients closely and frequently

For determine sample size for this study free online software G-power was used. Since the researchers decided to use a medium effect size, 2-sided testing, $\alpha=0.05$, $\beta=0.2$, and an equal sample size in both groups. $N2/N1$." the total sample size will be computed as 120 samples divided into two groups (Kang, 2021).

Inclusion criteria

All adult patients with acute low back pain, diagnosed acute low back pain patients by specialist physician, present with a new episode of acute low back pain, be able and willing to visit Physiotherapy dept.at Rzgary teaching hospital for commencement of the treatment program, a new episode of acute low back pain was defined as pain in the area between the 12th rib and buttock crease (with or without leg pain) of less than 12 weeks duration.

Exclusion criteria

Patients were excluded if they had any of the following, nerve root compromise, 'red flags' for serious spinal pathology (for example, infection, fracture), spinal surgery in the past 6 months, pregnancy, severe cardiovascular or metabolic disease, patients with psychological disorders, and who unwilling to participate in the current study.

Ethical consideration

the study was approved by Ethical Committee at College of Nursing in Hawler Medical University. Before the commencement of the study, written consent was obtained from all participants.

Procedure

Every participant will get medical treatment in accordance with the Rzgary teaching hospital recommended protocol for the treatment of acute musculoskeletal pain. Guidelines-based medical care involves telling patients that they have a good chance of recovering from acute or sub-acute LBP and encouraging them to stay active. Then consent was taken from each patient through consent form. After physical examination by the therapist the data was collected. A Numerical Rating scale (NRS) (0-10) was used for pain assessment (Breivik et al., 2008), this scale used for indicate the severity of pain, which is 0 to 10 scale 0 means there is (no pain) and 10 means (Worst pain imaginable). This scale is useful for those patients who decide on their pain based on numerical rate. Disability caused by acute or sub-acute LBP was assessed by Roland-Morris Disability Questionnaire (RMDQ) (Roland and Morris, 1983) It was made up of 24 elements that reflect typical tasks that patients can find challenging due to their low back pain issue. The greater the number of items selected, the greater the disability. On the day of the assessment, participants will be prompted to select the options that best describe their disability. After that patients were divided in Group A or Group B. participants were assessed three times which were after 1 week, 3 weeks and 3 months (post I, II and III) from all sessions asked patients to perform exercises regularly and continuously, at least five times a day. While William group after the first session with the physiotherapists, they were asked to perform all exercises only three times a day.

The Physiotherapy management was Group A

60 patients 30 males and 30 females were included in William's flexion exercise (WFE) group. The protocol was followed as(Elmahdy et

al., 2022). These exercises performed by trained physiotherapists, who graduated from physiotherapy technical institute and at physiotherapy dept. in Rzgary teaching hospital. As a protocol of low back pain case management, this department was used William Flexion Exercises (WFE) as a guide line. Patients were examined and diagnosed by specialist doctors then sent to exercises room to teach them how to perform exercises. William exercise is the only and most popular exercises that low back pain patients were learnt. The exercises include the following:

Pelvic tilt

Lie on your back with your knees bent and your feet flat on the floor. Press the small of your back up flat against the floor without using your legs. Maintain for 5-10 seconds.

Single knee to chest

Lay supine with flexed knees. Inhale as they slowly bring the right knee to shoulder, and hold for 5-10 seconds. Then repeat with the other knee.

Double knee to chest

From supine position, First bring the right knee to the chest, then the left, and hold for 5-10 seconds. Slowly bring legs down one at a time.

Partial sit-up

From crook lying slowly curl head and shoulders off the plinth. Hold and slowly return back to the beginning.

Hamstring stretch

Take long sitting position and bend forward from the waist, maintain their knees and arms extended and their eyes focused ahead.

Hip Flexor stretch

In this position, the feet should be hip-width apart, their left knee bent and their right knee held straight. Kneel on the floor with their left foot and flex their body forward until their left knee touches their left armpit. Replace the left leg with

the right one and do it again. Ten times more.

Group B:

60 patients 30 males and 30 females were included in McKenzie extension exercise (MEE) group. The protocol was followed as (Elmahdy et al., 2022). McKenzie exercises were performed very rarely. For this reason, researchers thought about this kind of exercise. First after conducting literature review, we organized an educational course with McKenzie extension exercise for those patients, who had acute or sub-acute low back pain. After those patients were diagnosed with acute low back pain by specialist physician then the researcher assessed the patients to collect data. Then conducting an educational program, which gave knowledge about the causes, signs and symptoms, methods of management of acute low back pain. Furthermore, based on McKenzie method, indicated the type of exercises which was suitable for particular patients. It includes the following exercises.

Prone exercise:

Position on their stomach, arms at your sides, and your head to one side. Keep this up for 5 to 10 minutes.

Prone on elbows:

Hips should be on the floor or mat, and they should be lying on your stomach with your weight distributed evenly between your elbows and forearms. Let your lower back relax. Do not move from this position for 5-10 minutes. If you have any pain, go back to the first exercise and try again.

Prone press-up:

Get on their stomach and bring their hands to their shoulders. Keeping the hips on the ground and the back and stomach sagging, slowly push the shoulders up. Lower their shoulders slowly.

Progressive extension with pillows

Put a pillow beneath their chests and lie on their stomach. Then, after a while (maybe a few minutes), they can add a second pillow. After a few minutes, if this is still comfortable.

Standing extension:

Stand with their hands at their waist and lean back slightly. Repetition: 20 second hold, then rest. If they have been lifting, leaning over, or sitting all day, try this routine to relax your back muscles.

The collected data statistically analyzed with the software SPSS version 28, and significant level $p= 0.5$ for normal distribution and student t-test were used (McKenzie and May, 2003)for data analysis. Furthermore, paired test was used to detect the effect of the program on each single patient from both groups.

Follow up

Patients were followed up by the researcher in three different time. After one week (post I), three week (post II) and three months (Post III). In each time participants assessed for level of disability by RMDQ and for severity of pain by using NRS.

RESULTS

Table 1 presents sociodemographic data of participants. 60 (%50) of participants were female and 60 (%50) were male. The majority of our participants from both groups were obese from WFE and MEE were 27(%45) and 28(%46.7) respectively. The vast majority of patients were married 46(%76.7) from WFE and 56(%93.3) from MEE. 22(%36.7) patients from WFE group have 1-3 children, while, 20(%33.3) of MEE patients have 4-6 children.

TABLE 1: Sociodemographic Characteristics of participants

Sociodemographic Characteristics	Groups			
	William group		McKenzie group	
	F.	%	F.	%

Gender	Female	30	50	30	50
	Male	30	50	30	50
Body Mass Index	Underweight	1	1.7	0	0
	Normal weight	16	26.7	13	21.7
	Overweight	16	26.7	19	31.7
	Obese	27	45	28	46.7
Marital Status	Single	14	23.3	4	6.7
	Married	46	76.7	56	93.3
Number of Children	None	17	28.3	8	13.3
	1-3	22	36.7	17	28.3
	4-6	14	23.3	20	33.3
	≥ 7	7	11.7	15	25

Table 2 illustrates data which related to medical information of study participants. 15(%25) of patients from WFE group have low back pain for 8-14 days. However, 21(%35) of MEE participants have low back pain for 30-59 days. The vast majority of participants from both groups WFE and MEE have constant pain 54(%90) and 50(%83.3) respectively. 23(%38.3) aggravated pain with bending. While, 21(%35) of WFE with sitting and risen from. Only 1(%1.7) and 2(%3.3) aggravated their pain with lying down from WFE and MEE respectively. On the

other hand, the participants from both group WFE and MEE relieving their pain with lying down 38(%63.3) and 37(%61.7) respectively. 42(%70) from WFE group and 39(%65) from MEE group have sleep disturbed with LBP. Furthermore, only 18(%30) of our participants have LBP with coughing. 39(%65), 42(%70) have LBP with sneezing from WFE, MEE groups respectively. The study found that the vast majority of participants 53(%88.3) from WFE and 51(%85) from MEE their pain radiated from lower back to buttock and to lower leg.

TABLE 2: Patients' medical information

Patients' medical information		Group			
		Control		Study	
		F.	%	F.	%
How long have you have been low back pain (days)	0-7	8	13.3	12	20
	8-14	15	25	7	11.7
	15-22	7	11.7	4	6.7
	23-29	14	23.3	11	18.3
	30-59	15	25	21	35
	60-90	1	1.7	5	8.3
Types of pain	Constant	6	10	10	16.7
	Intermittent	54	90	50	83.3
Aggravated Factors	Bending	16	26.7	23	38.3
	Sitting and risen from	21	35	13	21.7
	Standing	12	20	9	15
	Walking	10	16.7	13	21.7
	Lying	1	1.7	2	3.3
Relieving Factor	Bending	2	3.3	5	8.3
	Sitting and risen from	3	5	3	5
	Standing	2	3.3	7	11.7
	Walking	15	25	8	13.3
	Lying	38	63.3	37	61.7

Disturbed sleep	No	18	30	21	35
	Yes	42	70	39	65
Having Low Back Pain with coughing	No	42	70	42	70
	Yes	18	30	18	30
Having Low Back Pain with sneezing	No	39	65	42	70
	Yes	21	35	18	30
Radiated pain	No	7	11.7	9	15
	Yes	53	88.3	51	85

Table 3 shows that there is no significant difference between the age of participants (p-value is 0.952) of both groups. Moreover, the mean difference between the level of disability at pretest of our participants was non-significant (P

value is 0.568). Furthermore, the severity of pain score of participants from WFE group and MEE group before management is non-significant (p-value is 0.89).

TABLE 3: Characteristics of participants before management

Group		N	Mean	Std. Deviation	p value Two- sided
Age	William Flexion	60	42.62	5.978	0.952 NS
	McKenzie Extension	60	42.72	11.423	
Disability	William Flexion	60	12.77	3.567	0.568 NS
	McKenzie Extension	60	12.35	4.360	
Pain	William Flexion	60	6.83	1.291	0.890 NS
	McKenzie Extension	60	6.87	1.346	

Table 4 presents data of improvement of level of disability, based on the statistical analysis using the independent t-test which compare both groups indicate that the mean difference at the pretest is non-significant (p= 0.568). after the first assessment indicate that the means difference between WFE group and MEE group is highly significant (p <0.001). this result remains steady after three weeks (p < 0.001). after three month shows that there is a highly

significant mean difference between both groups (p <0.001). However, these improvements were more in the MEE group compare to WFE group. For WFE group mean and standard deviation level of disability was (5.483±0.7), while, the mean and standard deviation of MEE group became (2.133±0.5) and mean difference between both groups was (3.35±0.111), it was highly significant (p-value < 0.001)

TABLE 4: Comparison of level of disability by RMDQ pre and post test

Disability	William Flexion	McKenzie Extension			
	Mean± SD	Mean± SD	Mean Difference± Std difference	t-value	P-Value of Independent t-test
pretest	12.767±3,57	12.35±4.36	0.417±0,727	0.573	0.568

After 1 week	11.433±3.20	6.417±3	5.016±0.566	8.851	<0.001
After 3 weeks	10.883±3.14	3.5±2.15	7.383±0.52	14.184	<0.001
After 3 months	5.483±0.7	2.133±0.5	3.35±0.111	30.077	<0.001

Table 5 Illustrates data of altering the severity of pain which assessed based on NRS. It can be seen that mean and standard deviation of pain prior to assessment of WFE and MEE were 6.833±1.291 and 6.867±1.346 respectively, were nonsignificant mean difference (p value = 0.89). While the mean difference between both groups were highly significant (p < 0.001), the score of pain minimized only after one-week WFE and MEE became 5.9±1.349 and 4.433±1.382. these changing was more in MEE group than WFE group. Furthermore, after three weeks pain score

minimized further the mean difference were highly significant (p < 0.001). assessment of patients after three months indicated that the mean difference and standard difference deviation highly significantly changed (p <0.001). However, the mean difference and standard deviation of pain score between WFE group and MEE group was 3.233±0.204. This indicate that severity of pain minimized from both group but in MEE was minimized more than WFE group the mean difference was highly significant (p< 0.001).

TABLE 5: Comparison of pain severity between WFE and MEE by NRS.

Pain	William Flexion	McKenzie Extension			
	Mean± SD	Mean± SD	Mean Difference± Std difference	t-value	P-Value of Independent t-test
pretest	6.833±1.291	6.867±1.346	- 0.033 ± 0.241	-0.138	0.89
After 1 week	5.9±1.349	4.433±1.382	1.467± 0.249	5.882	<0.001
After 3 weeks	5.33±1.714	3.133±1.126	2.2± 0.264	8.307	<0.001
After 3 months	4.467±1.185	1.233±1.047	3.233± 0.204	15.831	<0.001

DISCUSSION

This study shows both McKenzie extension exercise and William flexion exercise have a significant effect on patients with acute and sub-

acute low back pain. However, the result of this study after the last assessment indicates that MEE was more effective than WFE in improving level

of disability and also minimizing severity of pain in those patients.

The present study indicates that obesity has a major role in low back pain and this was supported by (Biglarian et al., 2012; Zhang et al., 2018), we applied the same measurement for obesity. This indicates that increasing fat around the hip will have an impact on the lower back becoming straight because of the accumulation of fat and this pulled the pelvis forward, this straight lower back lead to lower back pain. Marriage was another aspect which has an impact on low back pain. This was consistent with the study by (Bento et al., 2020) a cross-sectional based on population survey, 600 individuals interviewed, they found out that marital status was associated with LBP in both men and women.

Another important aspect that has a significant impact on low back pain was having at least 4-6 children. However, this result is for both men and women are correct. This was congruent with the study by (Heuch et al., 2020) from Norwegian people they conclude that having at least one child has a significant association with low back pain. However, they looked for women only. And this finding will be much higher in Kurdish culture compare to Norwegian, because Kurdish women in Kurdistan they tend to have more than four children regularly.

Body posture and positioning were other factors that have an impact on acute low back pain based on our participants the majority of them from both groups their pain aggravated by bending and sitting. These are due to over stretching of the back muscles. This result was supported by (Sadler et al., 2017) they conducted a systematic review on prospective cohort studies. These studies investigated a range of musculoskeletal risk factors, most of which related to the lower back and pelvic region, for the development of LBP, and they concluded that limited lumbar lordosis was associated with an increased risk of developing LBP.

After the first session great improvement was seen from both severity of pain and level of disability. These was due to the fact that being active is more crucial in patients with LBP. It has a significant impact on the back muscles, which

they have a major role in presence of acute low back pain. At the first assessment patients nearly totally disabled because of the severe pain. The vast majority of the patients did not have enough information about the cause of their problem, therefore, the researcher act as a therapist and an educator at the same time to emphasis the main cause of their problem and how to enhance them to be active and encourage them to practice this exercise which has a significant effect on improvement their symptoms. MEE help the back muscles extend and blood supply to those muscles increased, it leads to relaxed and saturated by oxygen.

It is consistent with the quasi experimental study by (Qurat ul and Iqra, 2017) used conventional sampling technique for 120 patients with non-specific low back pain from 18-35 years Visual analogue scale and revised Oswestry disability index were used to measure pain and disability. They reported that there is a great reduction in pain and disability in McKenzie Extension exercise group in a short term. Although our assessment tools NRS and RMDQ are different, the results are similar.

On the other hand, this finding is inconsistent with A multi-centre randomized controlled trial with a 3-month follow-up by (Machado et al., 2010) they compare first-line care with McKenzie addition to first-line care for Patients seeking care for acute non-specific low back pain from primary care medical practices were screened. Eligible participants were assigned to receive a treatment program based on the McKenzie method and first-line care (advice, reassurance and time-contingent acetaminophen) or first-line care alone, for 3 weeks. Primary outcome measures included pain (0-10 Numeric Rating Scale) over the first seven days, pain at 1 week, pain at 3 weeks. Treatment effects were estimated using linear mixed models. They have reported that there was a significant reduction in pain from both groups at the first week, however, they indicated that there was not significant difference between patient's improvement from both groups. This clarified that they have an issue in blinding of therapists. Furthermore, they pointed out that participants from first-line care sought more additional care compared to

McKenzie and first-line care group. This will not allow to indicate the difference between these two treatment groups.

Alternatively, the RCT of 40 patients with chronic low back pain aged 20-60 years were placed in two groups. The Williams flexion exercise was applied in the first group while the McKenzie extension exercise technique was applied in the second group. The visual analog scale (VAS) and Oswestry low back pain disability index (OLBODI) were used for assessing pain and level of disability respectively. They presented that William Flexion Exercises had a significant impact on minimizing pain and level of disability. The sample size of this study was very small to detect the effectiveness of one of the techniques. At the same time, they did not give a clear rationale for this determination, and their patients have chronic low back pain which is different from the current study. Moreover, McKenzie (2000) pointed out that patients with acute low back pain should not do flexion exercises until they become better and their muscles adjust to the particular situation.

Prospective quasi-experimental comparative trial of pre-post study design 34 adolescent 13-18 years old with non-specific low back pain randomly divided into two groups Group A received McKenzie extension exercises; and Group B received William flexion exercises. For 4 weeks, and have data collection at second week post I and fourth week post II based on visual analogue scale, flexibility score, vestibular balance and balance board scores. They concluded that, although, there is no significant difference between both techniques, both have great effect on decreasing pain (Elmahdy et al., 2022). It can be seen that their samples were adolescents, which seems not to be practice the order exactly, and did not illustrate either they were acute or chronic cases.

Early data showed that in terms of pain reduction, pain incidence while sitting, pain-free lumbar movement, and recovery time, the McKenzie exercise plan was superior to William's exercise (Moldovan, 2012). on the other hand, Jeganathan, Kanhere and Monisha (2018) highlighted that William's flexion exercises are

more successful at reducing mechanical LBP than McKenzie extension exercises.

There are many strengths of the current study which are the duration for assessment and the tools that used are validated and reliable. In addition, diversity of the age groups and the balance between men and women gives another strong point for the study. Furthermore, the sample size which is good enough to evaluate interventions. The finding of this study could have a substantial effect on the patient's outcome and minimizing the cost of management of LBP cases. On the other hand, to obtain the better results to apply in to practice RCT is highly evidence based, and also for longer duration of time. Future study of truly randomized controlled trail design of multicentral of primary care with public support for acute, sub-acute and chronic low back pain recommended.

CONCLUSION

This study found out that McKenzie Extension Exercise is more effective in reducing pain and improving level of disability compare to William Flexion Exercises. McKenzie group participants showed significant improvement. After first week pain decreased significantly and this progression continue after third week of intervention and reached the pick by the end of third month. The further study is highly recommended which is a Randomized controlled trial will have strengths this finding in the future study.

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Author contribution

Authors contributed equally in the study.

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