Effectiveness of McKenzie Therapy Combined with Educational Interventions on Low Back Pain and Functional Disability among School Teachers in Tamil Nadu: A School-Based Study

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Abstract:

The study aimed to evaluate the effectiveness of McKenzie Therapy combined with educational interventions in reducing low back pain and functional disability among school teachers. Lower back pain (LBP) is a common occupational hazard in the teaching profession, often resulting from prolonged standing, poor posture, and repetitive movements. This quasi-experimental study involved 40 school teachers with mild to moderate LBP, selected through purposive sampling and divided into an experimental group and a control group. The experimental group underwent a 10-day intervention comprising McKenzie Therapy exercises and structured educational sessions on posture, ergonomics, and self-care, while the control group followed their routine practices. Pain and disability were measured using the Visual Analog Scale (VAS) and the Oswestry Disability Index (ODI) before and after the intervention. The pre-test scores showed no significant differences between groups. However, post-test results indicated a highly significant improvement in the experimental group, with mean disability scores reducing from 10.30 to 3.30 and VAS scores from 5.40 to 2.30 (p=0.001). The control group showed minimal change. No significant association was found between pain or disability and demographic or clinical variables. These findings suggest that a multimodal intervention integrating McKenzie Therapy and education can effectively reduce pain and functional limitations in school teachers. The study concludes the importance of preventive and rehabilitative measures in occupational health programs.

Keywords*: Low Back Pain, McKenzie Therapy, Educational Intervention, Functional Disability, School Teachers, Visual Analog Scale, Oswestry Disability Index.*

Introduction:

Lower back pain (LBP) is a pervasive musculoskeletal disorder worldwide and a major cause of disability and work-related impairment (Prieto-González et al., 2021). Among occupational groups, school teachers represent a high-risk population: their job involves prolonged standing, repetitive bending over desks or blackboards, awkward postures, carrying teaching materials, and static work conditions known to predispose to LBP and functional disability. Indeed, recent literature reveals substantial prevalence of LBP among teachers globally: a meta-analysis of African school teachers estimated a pooled annual prevalence of 59.0 % (Tesfaye et al., 2023), while another cross-sectional survey among secondary school teachers in India reported a 12-month LBP prevalence of 41.8% (secondary school teachers in Odisha) (Behera et al., 2021). Similarly, a study among school teachers showed a prevalence of 64.6% non-specific LBP, with various occupational and demographic factors contributing (Ramya et al., 2024). These high prevalence estimates underscore the occupational burden of LBP among teachers and highlight the need for effective interventions tailored to this group.

Given this burden, there is a strong impetus to explore evidence-based therapeutic strategies. The McKenzie Method (MDT), which uses repeated movements, directional preference exercises, and spinal mobilisation to centralise symptoms and improve spinal mechanics, has been widely adopted in physiotherapy practice. Recent reviews and clinical trials provide mixed but cautiously optimistic evidence: a systematic review found that when delivered by credentialed therapists to patients with chronic LBP exhibiting directional preference, MDT produced low-to-moderate certainty improvements; specifically, clinically important reductions were observed for pain up to 6 months and for disability up to 12 months post-intervention (Hennemann et al, 2025). Similarly, a comprehensive review concluded that McKenzie exercises remain a promising option in chronic mechanical LBP management (Machado et al., 2006). Additionally, a 2025 biomechanical comparative study showed that MDT produced greater improvements in pain, lumbar range of motion (ROM), and disability compared to core stability exercises (Nashrullah et al., 2025).

LBP is not merely a biomechanical problem. Chronic and recurrent LBP often involve behavioural, ergonomic, and psychosocial dimensions including poor posture habits, lack of awareness of safe movement, fear-avoidance, and poor self-management. Consequently, purely exercise-based interventions may fall short of addressing the full spectrum of contributing factors. Integrative programs like the Back School Program (which combines exercise with education on posture, ergonomics, and

self-care) have demonstrated significant reductions in pain and disability, decreased fear-avoidance, and improved physical functioning among adults with non-specific LBP (Hernandez-Lucas et al., 2024). A review on non-specific LBP found that combining physiotherapy with educational components (posture, ergonomics, pain education) yielded better long-term outcomes compared to physiotherapy alone (Ibrahim et al., 2023). These findings lend support to a biopsycho social approach: addressing not only physical impairments but also knowledge, behaviour, and ergonomics.

Despite the promise, there is a paucity of studies assessing the combined effect of MDT with structured educational interventions especially in high-risk occupational groups such as school teachers. Most literature either examines prevalence among teachers or evaluates MDT in general adult LBP populations. There is limited or no research specifically targeting school teachers with a combined McKenzie and education protocol. That gap between a high-prevalence, high-risk population and an evidence-based but under-combined therapy underpins the rationale for the present study. The main aim of this study is to evaluate effectiveness of McKenzie Therapy and structured educational interventions in reducing low back pain intensity and improving functional disability among school teachers.

Materials and Methods

A quantitative, quasi-experimental design with a pre-test and post-test control group was used to assess the effectiveness of McKenzie Therapy combined with educational interventions on low back pain and functional disability among school teachers. The research was conducted among teachers from two government-aided higher secondary schools in Chidambaram, Tamil Nadu. Participants were divided into an experimental group and a control group, each comprising 20 school teachers selected using purposive sampling technique.

Teachers aged between 30 and 58 years, currently experiencing mild to moderate low back pain and associated disability were included in the study. Teachers with severe low back pain, or those with comorbid conditions such as diabetes or hypertension, were excluded. The total sample size of 40 was calculated using a statistical formula based on prior study data with an estimated standard deviation of 9.4 and a mean score difference of 9, yielding 20 participants per group for 85% power at a 5% significance level.

Data collection was carried out over a four-week period. The tools used included a demographic and clinical data, the Visual Analog Scale (VAS) for pain assessment, and the Oswestry Disability Index (ODI) to measure functional disability. These tools are both validated and widely used in clinical research, with the VAS ranging from 0 (no pain) to 10 (worst pain imaginable), and the ODI consisting of ten items, each scored from 0 to

5, providing a comprehensive measure of disability severity. Content validity was ensured by expert review, and reliability was confirmed via test-retest method, with coefficients of 0.989 for VAS and 0.83–0.99 for ODI.

Before the intervention, baseline data were collected from both groups. The experimental group consisted of McKenzie Therapy exercises like relaxed prone, McKenzie push-up with hand support, prone push-up with forearm support, and repeated extension in standing—demonstrated by the researcher. Each exercise was performed twice daily for 20 minutes over 10 days. In addition to the exercise protocol, participants received a structured educational session delivered in Tamil using PowerPoint presentation. The content included information on low back pain aetiology, risk factors, prevention strategies, and demonstration of therapeutic exercises.

Post-intervention assessments were conducted after four weeks using the same measurement tools. Data analysis was performed using SPSS version 22. Descriptive statistics were used to summarize demographic and clinical characteristics. Inferential statistics including independent and paired t-tests, and chi-square tests, were used to compare within-group and between-group differences. A p-value ≤0.05 was considered statistically significant. Ethical approval for the study was obtained from the Institutional Human Ethics Committee, Government Medical College, Cuddalore, and written informed consent was secured from all participants prior to data collection.

Results

Sociodemographic variables

The mean age of participants was 50.75 ± 4.99 years.The majority of participants in the experimental group (60%) were aged 41–50 years, while most in the control group (65%) were aged 51–60 years. Females made up 70% of the experimental group, whereas 55% of the control group were female. Most of the participants in both groups were postgraduates95% in the experimental group and 85% in the control group. Most followed a non-vegetarian diet (65% experimental, 70% control), and all were married (100%). Regular exercise was reported by 50% in the experimental group and 70% in the control group. Rural residence was noted in 60% of the experimental group and 50% of the control group. Most participants had over 10 years of teaching experience (75% experimental, 60% control) (Table 1).

Table1: Demographic variables among schoolteacherswith low back pain anddisability.

N=40

Demo graphic variables		Group				Chisquare test
		Experimental(n=20)		Control(n=20)		
		n	%	n	%	
Age	31-40years	0	0.00	0	0.00	□2=2.51 df=1p=0.11(NS)
	41-50years	12	60.00	7	35.00	
	51-60years	8	40.00	13	65.00	
Gender	Male	6	30.00	9	45.00	□2=0.96 df=1p=0.32(NS)
	Female	14	70.00	11	55.00	
Education	Under Graduate	1	5.00	3	15.00	□2=1.11 df =1p=0.29(NS)
	PostGraduate	19	95.00	17	85.00	
	Ph.D	0	0.00	0	0.00	
DietaryPattern	Vegetarian	7	35.00	6	30.00	□2=0.11 df =1p=0.74(NS)
	NonVegetarian	13	65.00	14	70.00	
Maritalstatus	Married	20	100.00	20	100.00	□2=0.00 df =1p=1.00(NS)
	Unmarried	0	0.00	0	0.00	
Habit of doingexercises	Yes	10	50.00	14	70.00	□2=1.66 df =1p=0.19(NS)
	No	10	50.00	6	30.00	
Placeofresidence	Rural	12	60.00	10	50.00	□2=0.40 df =1p=0.53(NS)
	Urban	8	40.00	10	50.00	
Working Experien	<5years	0	0.00	0	0.00	□2=1.02 df
	5-10years	5	25.00	8	40.00	

ce	>10 years	15	75.00	12	60.00	=1p=0.31(NS)
Positioninschool	1-5thclassteacher	0	0.00	0	0.00	□2=1.75 df=1 p=0.18(NS)
	6-8thclassteacher	5	25.00	9	45.00	
	9-12thclassteacher	15	75.00	11	55.00	

p>0.05 not significant (NS).

Clinical Variables

In both the experimental and control groups, 50% of participants had a Body Mass Index (BMI) in the normal range (18.6–24.9), while the remaining 50% were categorized as overweight (BMI 25.0–30.4). The majority of participants reported experiencing low back pain for 1–2 years, with 85% in the experimental group and 65% in the control group falling into this duration category. All participants (100%) in both groups had no associated diseases. Most participants reported mild pain severity, accounting for 70% in the experimental group and 65% in the control group. Regarding mode of transport, the majority in both groups used two-wheelers, with 70% in the experimental group and 60% in the control group relying on this mode (Table 2).

Table-2: C**linical variable among school teachers with low back pain and disability**

N=40

Clinicalvariables		Group				Chisquare test
		Experimental(n=20)		Control(n=20)		
		n	%	n	%	
BMI	15.5–18.5	0	0.00	0	0.00	□2=0.00 df=1p=1.00(NS)
	18.6–24.9	10	50.00	10	50.00	
	25.0–30.4	10	50.00	10	50.00	
Duration of Pain	1–2years	17	85.00	13	65.00	□2=2.13 df =1p=0.14(NS)
	2–3years	3	15.00	7	35.00	
	3–4years	0	0.00	0	0.00	
	>5 years	0	0.00	0	0.00	

Associat eddiseas e	Pelvic inflammato ry disease	0	0.00	0	0.00	□2=0.00 df =1p=1.00(NS)
	Osteoarthritis	0	0.00	0	0.00	
	Kidney disease	0	0.00	0	0.00	
	Nil	20	100.00	20	100.00	
Severity of pain	Mild	14	70.00	13	65.00	□2=0.11 df =1p=0.73(NS)
	Moderate	6	30.00	7	35.00	
	Severe	0	0.00	0	0.00	
	Heavy	0	0.00	0	0.00	
Mode of Transport	Bus	3	15.00	4	20.00	□2=0.44 df =2p=0.80 (NS)
	Two Wheeler	14	70.00	12	60.00	
	Walk	3	15.00	4	20.00	

p>0.05 not significant(NS)

Pre-test level of disability and low back pain

In the pre-test assessment, the majority of participants in both groups reported mild disability, with 95% in the experimental group and 85% in the control group. A small proportion experienced moderate disability—5% in the experimental group and 15% in the control group. No participants reported severe or complete disability. Regarding pain levels, 45% of the experimental group and 40% of the control group reported moderate pain. Mild pain was noted in 30% of the experimental group and 35% of the control group, while 25% in each group experienced severe pain. There were no statistically significant differences between the groups (Table 3 & Table 4).

Table-3: Distribution of disability among school teachers in experimental and control group in pretest

N=40

Level of disability	Experimental group		Control group		Chisquaretest
	n	%	n	%	
Nodisability	0	0.00	0	0.00	□2=0.32 df =1P=0.57(NS)
Milddisability	19	95.00	17	85.00	
Moderatedisability	1	5.00	3	15.00	

Severedisability	0	0.00	0	0.00	
Completelydisabled	0	0.00	0	0.00	
Total	**20**	**100**	**20**	**100**	

p>0.05notsignificant (NS)

Table4: **Distribution of low back pain among school teachers in experimental and control group in pretest**

N=40

Level of Pain score	Experimental group		Control group		Chisquaretest
	n	%	n	%	
No pain	0	0.00	0	0.00	□2=0.10 df =1 P=0.93(NS)
Mild pain	6	30.00	7	35.00	
Moderate pain	9	45.00	8	40.00	
Severe pain	5	25.00	5	25.00	
Total	**20**	**100**	**20**	**100**	

p>0.05notsignificant (NS)

Effectiveness of McKenzie Therapy Combined with Educational Interventions

In terms of disability, there was no significant difference between the experimental and control groups at pre-test (p=0.83). However, after the intervention, the experimental group showed a substantial improvement with a mean disability score of 3.30 compared to 9.75 in the control group (p=0.001), indicating a very high level of significance. Similarly, for pain levels measured using the Visual Analog Scale (VAS), both groups were similar at baseline (p=0.92), but post-test results showed a significant reduction in pain in the experimental group (mean=2.30) compared to the control group (mean=5.10), also with p=0.001, which showed the effectiveness of McKenzie Therapy combined with educational interventions (Table 5 & Table 6).

Table5: **Comparison of mean disability among school teachers between the experiment and control group both pretest and posttest**

N=40

	Group					Student in dependent t-test
Disability Assessments	Experimental		Control		Mean difference	
	Mean	SD	Mean	SD		
Pre-test	10.30	1.34	10.15	2.85	0.15	t=0.21DF=38p=0.83(NS)
Posttest	3.30	1.62	9.75	2.57	6.45	**t=9.48DF=38p=0.001***(S)**

P≤0.001 *** very high significant (S)

Table 6: Comparison of vas pain score between experiment and control group among school teachers both pretest and posttest

N=40

VAS pain Assessments	Group				Mean difference	Student independent t-test
	Experimental		Control			
	Mean	SD	Mean	SD		
Pre-test	5.40	1.60	5.45	1.32	0.15	t=0.11DF=38p=0.92(NS)
Post-test	2.30	1.75	5.10	1.02	2.80	**t=6.18DF=38p=0.001***(S)**

p≤0.001* very high significant (S)**

Association with demographic and clinical variables

The analysis revealed no statistically significant association between the pre-test pain scores and any of the demographic or clinical variables among school teachers with low back pain in the selected schools. Similarly, there was no significant relationship between disability levels and demographic or clinical factors. This suggests that variables such as age, gender, BMI, work experience, and exercise habits did not significantly influence baseline pain or disability in this population.

Discussion

Before interventions, most teachers in both groups had only mild disability (95% experimental vs. 85% control), with a small share showing

moderate disability (5% vs. 15%). Regarding pain, 45% (experimental) and 40% (control) reported moderate pain; mild pain occurred in 30% vs. 35%, and severe pain in 25% of each group. These findings are consistent with a study by Almansour et al., 2024 who surveyed 601 school teachers and reported that 62.6% experienced LBP, many with low-to-moderate disability rather than severe impairment. Similarly, Shegere et al., 2025 found a 51.5% prevalence of LBP in teachers, with higher BMI and work stress as key risk factors; their results suggested many had non-severe pain yet recurrent symptom.

The present study showed a significant post-test reduction in both disability and pain levels among participants receiving McKenzie Therapy combined with educational interventions are supported by a study by Ibrahim et al. (2023) who reported that integrating patient education with motor control exercises significantly improved pain and disability scores in adults with chronic low back pain. Similarly, Sun et al. (2021) conducted a network meta-analysis and found that combining exercise with health education was more effective than standalone interventions for reducing non-specific chronic low back pain among nurses. These findings reinforce the value of multimodal strategies like yours, particularly in occupational groups such as teachers who face persistent ergonomic stressors contributing to low back pain and disability.

The findings showed that none of the demographic or clinical variables showed a statistically significant association with pre-test low back pain or disability which was supported by a study by Behera & Koley, 2021 who found a 41.8% prevalence of low back pain, but factors such as BMI, gender, or work experience were not consistently significantly associated with pain or disability after multivariate analysis. Similarly, a study by Gemedo et al., 2023 reported high prevalence of low back pain but did not find strong independent associations between LBP and demographic variables like age or sex; instead, occupational factors (standing duration, class load) were more relevant.

Limitation

The sample size was relatively small and limited to two schools in one geographic area, which may affect the generalizability of the findings. The use of purposive sampling could introduce selection bias. The short duration of the intervention (five days) limits understanding of long-term effects. Self-reported measures may also be influenced by personal bias or inaccurate recall.

Conclusion

The study concluded that McKenzie Therapy combined with educational interventions was highly effective in reducing low back pain and

functional disability among school teachers. Significant improvements were observed in post-test scores of both pain and disability in the experimental group compared to the control group. The findings highlight the importance of integrating structured exercise and ergonomic education into routine school health programs. Such interventions can play a vital role in enhancing occupational health and well-being among teaching professionals.

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Conflicts of interest: Nil

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