

Effectiveness of Evidence Based Physical Therapy Management Approaches in Sacroiliac Joint Dysfunction: A Meta-analysis

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ABSTRACT

Worldwide the prevalence of sacroiliac joint dysfunction (SIJD) lies within a range of 13% to 30%. In approximately 10% to 25% of patients, SIJD is a cause of mechanical low back and leg pain. A total of 498 subjects included in 10 studies conducted from 2018 to 2022 were included in this analysis. The guidelines of PRISMA were followed for study identifications and analysis in which pain and disability were monitored as an outcome measure. The results revealed statistically significant findings of physical therapy-based management approaches in decreasing pain (SMD -1.068, $p=0.0001$, $I^2=95.11\%$) and lowering the levels of disability (SMD -0.997, $p=0.0001$, $I^2=95.76\%$) among patients with SIJD as estimated using a random effect model. It was concluded that physical therapy-based management approaches ranging from combined exercise therapy to MET and K-taping are significantly more effective than traditional approaches.

Key Words: Exercise, Sacroiliac joint, Pain, Disability, Physical therapy, Muscle energy technique, Kinesiotaping.

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INTRODUCTION

Worldwide, the prevalence of sacroiliac joint dysfunction (SIJD) lies within a range of 13% to 30%.¹ In approximately 10% to 25% of patients, SIJD is a cause of mechanical low back and leg pain.² Pregnancy-related low back and hip pain have been reported in 20% of women, who have chronic disabling pain in approximately 5% of cases after childbirth.³ The pathophysiology of SIJD among females has mainly dependent upon the biomechanics and angle of the joint.⁴ Due to less curved, posterior tilt and wider sacrum, sciatic notch, and acetabula; the risk of SIJ alignment has greatly increased among females.⁵ Besides that, during pregnancy the increase in axial load due to increase in abdominal and intrauterine pressure coupled with the laxity of spinal ligaments and pelvic structure greatly altered the biomechanics. Thereby, increases the risk of developing moderate to severe pain by three-fold due to SIJ dysfunction.⁶

SIJD pain commonly referred to back and buttocks that radiates to the knee joint.⁷ The aggravating factors involved standing up from sitting position and lying down, besides that the pain also exacerbates during climbing up and descending from stairs.⁸

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Patients report stabbing pain deep into the buttocks that is often localised at the posterior side of the pelvis.⁸

Multiple management approaches ranging from pharmaceutical management to physiotherapy and even surgeries are recommended in extreme cases depending upon patient condition;⁹ but in recent decades, the prime consideration has been given to physical therapy-based management approaches for SIJD. Several physical therapy interventional approaches provided to patients for managing pain and reducing disability are often the same as those used during mechanical low back pain management. These techniques include manual therapy, cupping, muscle energy technique, K-taping, SIJ stabilisation using the sacroiliac joint belt, and electrotherapy applications that may include but are not limited to transcutaneous nerve impulse and therapeutic ultrasound.¹⁰ All of them are considered as a paramount physical therapy technique for the management of pain and disability.

Hence, based on available evidence, the present study aims to identify the impact of physical therapy-based management approaches that have recently been modified from conventional to contemporary in managing pain and disability among patients with SIJD.

METHODOLOGY

A total number of 10 studies including 498 participants were analysed following the guidelines of preferred reporting items for systematic reviews and meta-analysis (PRISMA).

Table I: Represents characteristics and features of the included studies.

Author' Year	Sample Size	Target Population	Study Design	Age	Intervention		Outcome
					Intervention Group	Control Group	
Sabrina <i>et al.</i> , 2022 ¹²	EG=26 CG=26	Postpartum women with SIJD	RCT	20-35 years	Kinesio Taping	Muscle Energy Techniques	Pain and disability
Aghalar <i>et al.</i> , 2021 ¹³	EG=23 CG=23	Women with SIJD	RCT	18-60 years	Manual therapy and SIJ exercise program being performed at home	SIJ home and lumbar exercises program, home therapy	Pain and disability
Hui <i>et al.</i> , 2021 ¹⁴	EG=48 CG=48	Patients with lumbopelvic pain after childbirth.	RCT	20 and 35 years	Pelvic floor exercises along with TENS	TENS only	Pain and disability
Ordahan B & Eriç Horasanlı J, 2021 ¹⁵	EG=25 CG=25	Women with SIJD	RCT	X=25.60 in experimental group and X= 24.71 in Control Group	KinesioTaping	Sham Kinesiotaping	Pain and disability
Kamali <i>et al.</i> , 2019 ¹⁶	EG=15 CG=15	Patients with sub-acute or chronic SIJD	RCT	20 to 60 years	Manipulation	Conventional Physical Therapy	Pain and disability
Khobragade S <i>et al.</i> , 2019 ¹⁷	EG=37 CG=37	Postpartum female with SIJ pain	RCT	20 to 45 years	K-taping	Conventional training	Pain and disability
ElDeeb AM <i>et al.</i> , 2019 ¹⁸	EG=20 CG=20	Postpartum women with pelvic pain due to SIJ dysfunction	RCT	25-35 years	Pelvis stabilisation exercises	Conventional training	Pain and disability
Vaseghnia <i>et al.</i> , 2019 ¹⁹	EG=25 CG=25	Women with SIJD pain	RCT	18 to 40 years	Muscle Energy Technique (MET)	Sham positioning training	Pain and disability
Teymuri <i>et al.</i> , 2018 ²⁰	EG=18 CG=18	Postpartum lumbopelvic pain due to SIJ dysfunction	Single blind RCT	X=33.55 in the experimental group and X= 36.77 in the control group	Electrotherapy and mobilization with stabilization exercises	Electrotherapy modalities	Pain and disability
Brizzolara <i>et al.</i> , 2018 ²¹	EG=12 CG=12	Women with SIJ Pain	RCT	18 to 65 years	Lumbar Stabilisation Exercises and Lumbar Compression Belt	Supervised Lumbar Stabilization Exercises	Pain and disability

EG denotes the Experimental group, CG denotes the Control Group.

Multiple searches are performed on physical therapy-based management approaches among female patients with SIJD were identified using search engines such as, Google Scholar, PEDro, MEDLINE, Cochrane Library, EMBASE, and Web of Science by using MeSH terms like physical therapy, sacroiliac joint dysfunction, pain, disability, exercise, and low back pain.

Inclusion criteria comprised of all those studies in which the effects of physical therapy-based management approaches were determined on pain intensity and levels of disability among SIJD patients and were published from 2018 to 2022 to provide the quantitative as well as qualitative analysis of the findings of most recently conducted studies. Trials in which participants underwent different surgical approaches were excluded along with all those trials that were performed on patients with SIJD but the interventional strategies other than physical therapy management were excluded from the analysis. Furthermore, unavailable full text articles and all those studies in which languages other than English were used, and all those studies for which open access had not been provided after being contacted by authors through emails were excluded. Thereafter, going through all the screening criteria (n=10) studies were analysed that had met the inclusion criteria as shown in Table I.

Assessment of the risk of biasness of included studies was performed based on Cochrane tool parameters.¹¹ In addition, the assessment was performed for risk of allocation (randomisation and concealing), blinding (participation and

outcome) data assessment (incomplete and selective reporting), and biasness of other types based on the author's judgment.

MedCalc, statistical software version 20.112 was used for quantitative analysis. Continuous measure analysis was performed to determine the pooled effect based on standardised mean difference (SMD) at 95% of CI. The effect size was estimated using a Cohen's rule of thumb that had categorised an effect size on three parameters; a small effect size if the values of SMD lie within the range of 0.2 to 0.5; moderate if the values found within the range of 0.5 to 0.8, and large if the values found to be greater than 0.8. For the level of heterogeneity value of I^2 were used to interpret based on the random and fixed effect model ($I^2 \leq 50$ fixed effect, $I^2 \geq 50$ Random effect).

RESULTS

A sample size of 498 participants; included in 10 studies were analysed in which the effects of physical therapy-based management approaches for SIJD were estimated on disability, and pain. After searching potentially relevant published articles from six electronic databases, initially n=120 original articles were included. Further evaluation of the initially selected articles led to the exclusion of duplicated and those articles in which physical therapy management approaches estimated after joint fusion surgeries and in which other management protocols like chiropractic and massage technique were involved, hence n=30 article remains.

Table II: Shows SMD for pain on a random effect model within 95% of CI and statistical heterogeneity.

Study	N1	N2	Total	SMD	SE	95% CI	t	P	Weight (%)	
									Fixed	Random
Sabrina <i>et al.</i> , 2022	26	26	52	-0.516	0.278	-1.074 to 0.0421			13.56	10.21
Aghalar Javadov <i>et al.</i> , 2021	23	23	46	-2.335	0.378	-3.098 to -1.572			7.30	9.90
Hui <i>et al.</i> , 2021	48	48	96	-1.392	0.226	-1.841 to -0.943			20.48	10.33
Ordahan <i>et al.</i> , 2021	25	25	50	-2.668	0.386	-3.443 to -1.892			7.04	9.88
Kamali <i>et al.</i> , 2019	15	15	30	0.880	0.373	0.116 to 1.644			7.52	9.92
Khobragade <i>et al.</i> , 2019	37	37	74	1.444	0.259	0.928 to 1.960			15.62	10.25
ElDeeb <i>et al.</i> , 2019	20	20	40	-2.496	0.417	-3.341 to -1.652			6.02	9.77
Vaseghnia <i>et al.</i> , 2019	25	25	50	-2.137	0.351	-2.843 to -1.431			8.50	9.99
Teymuri <i>et al.</i> , 2018	18	18	36	-1.663	0.380	-2.435 to -0.890			7.24	9.90
Brizzolara <i>et al.</i> , 2018	12	12	24	0.0974	0.394	-0.721 to 0.915			6.73	9.85
Total (fixed effects)	249	249	498	-0.867	0.102	-1.068 to -0.666	-8.478	<0.001	100.00	100.00
Total (random effects)	249	249	498	-1.068	0.470	-1.991 to -0.145	-2.273	0.023	100.00	100.00
Q						184.1767				
DF						9				
Significance level						p <0.0001				
I ² (inconsistency)						95.11%				
95% CI for I ²						92.76 to 96.70				

Table III: Shows SMD for disability on a random effect model within 95% of CI and Statistical Heterogeneity.

Study	N1	N2	Total	SMD	SE	95% CI	t	P	Weight (%)	
									Fixed	Random
Sabrina <i>et al.</i> , 2022	26	26	52	-0.526	0.278	-1.084 to 0.0324			13.89	10.19
Aghalar Javadov <i>et al.</i> , 2021	23	23	46	-1.665	0.338	-2.346 to -0.984			9.40	10.05
Hui <i>et al.</i> , 2021	48	48	96	-1.131	0.218	-1.564 to -0.697			22.52	10.31
Ordahan <i>et al.</i> , 2021	25	25	50	-3.241	0.427	-4.100 to -2.382			5.88	9.79
Kamali <i>et al.</i> , 2019	15	15	30	0.442	0.360	-0.295 to 1.179			8.29	9.99
Khobragade <i>et al.</i> 2019	37	37	74	2.747	0.322	2.104 to 3.389			10.33	10.09
ElDeeb <i>et al.</i> , 2019	20	20	40	-3.213	0.474	-4.173 to -2.253			4.77	9.64
Vaseghnia <i>et al.</i> , 2019	25	25	50	-1.701	0.326	-2.357 to -1.045			10.08	10.08
Teymuri <i>et al.</i> , 2018	18	18	36	-1.369	0.364	-2.109 to -0.630			8.11	9.98
Brizzolara <i>et al.</i> , 2018	12	12	24	-0.456	0.400	-1.285 to 0.373			6.72	9.88
Total (fixed effects)	249	249	498	-0.821	0.104	-1.025 to -0.617	-7.925	<0.001	100.00	100.00
Total (random effects)	249	249	498	-0.997	0.511	-2.001 to 0.00791	-1.949	0.052	100.00	100.00
Q						212.0917				
DF						9				
Significance level						p <0.0001				
I ² (inconsistency)						95.76%				
95% CI for I ²						93.82 to 97.09				

After further analysis, all those articles that were published before 2018, not available in English language, did not have their full-text available even after contacting the authors, and all paid articles were excluded. Finally, ten studies were included for analysis. Flow of studies is illustrated in Figure 1.

The findings from ten randomised controlled trials revealed that the physical therapy intervention showed significant improvement in decreasing pain in comparison to the control group. Standardised mean difference suggested an effect size of -1.068 in random effect model (I² = 95.11%; p <0.0001)

depicted a large effect size suggesting the beneficial effects of physical therapy in the management of pain among SIJD patients (Table II).

The diagrammatic illustration of the effect size of individual studies and the pooled effect at fixed and random effect model of studies was demonstrated in forest plot Figure 2.

A total of ten studies were analysed through continuous measure analysis, SMD to determine the effect size. The analysis revealed a random effect size of -0.997 (I² = 95.76%;

$p < 0.0001$) which is a larger effect, hence favouring physical therapy as an effective tool in decreasing disability among SIJD patients (Table III).

The diagrammatic illustration of the effect size of individual studies and the pooled effect at fixed and random effect model of studies was demonstrated in forest plot Figure 3.

Author's judgment of risk of bias analysis based on guidelines of Cochrane was provided in Figure 4. The randomisation sequence analysis suggested that all nine studies revealed low risk of bias.¹²⁻²¹ All studies under this parameter revealed low risk of all allocation concealment bias as per author's judgment.¹²⁻²¹ Seven studies considered the participants blinding,^{13-16,18-20} whereas, two studies reflected unknown approach.^{12,17,20} Four studies showed high risk of outcome assessment blinding bias,^{12,13,16,21} six studies^{14,15,17-19} showed low risk of bias, and only one study represented unknown risk.¹⁷ Four studies showed high risk of bias,^{12-14,16} while the remaining represented low risk for incomplete outcome data.^{15,17-21} All studies reflected low selection bias risk.

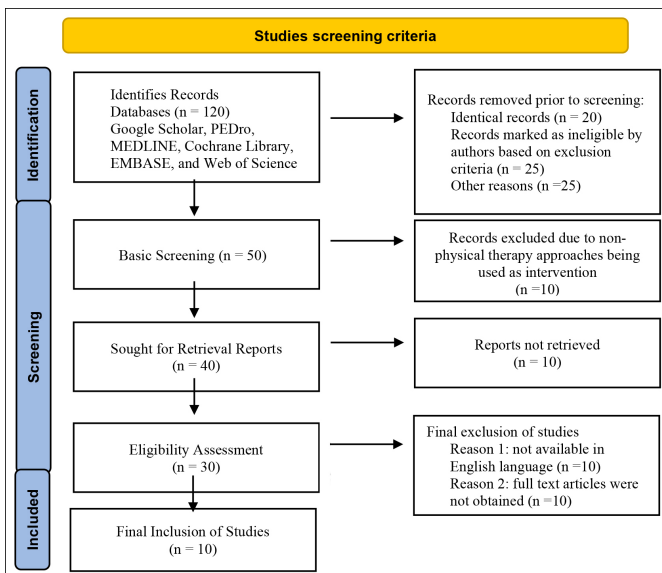


Figure 1: Represents flow of studies in accordance to PRISMA statement.

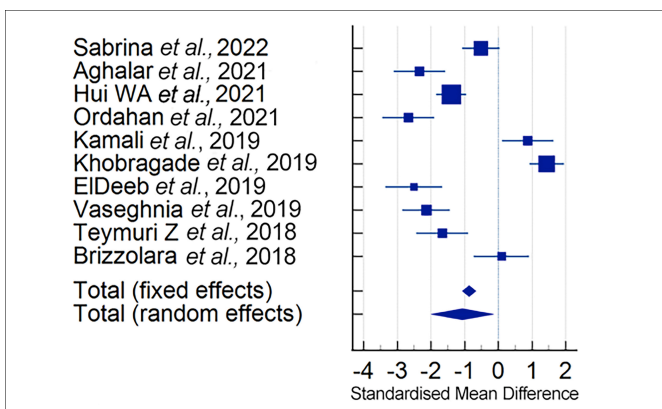


Figure 2: Represents studies that reported significantly decrease in pain among patients of SIJ dysfunction.

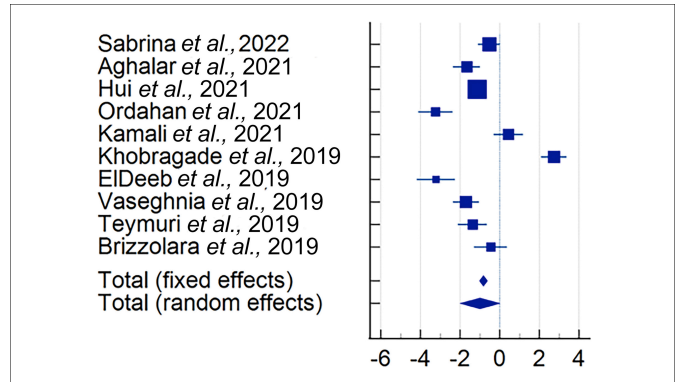


Figure 3: Represents studies that reported significantly decrease disability among patients of SIJD.

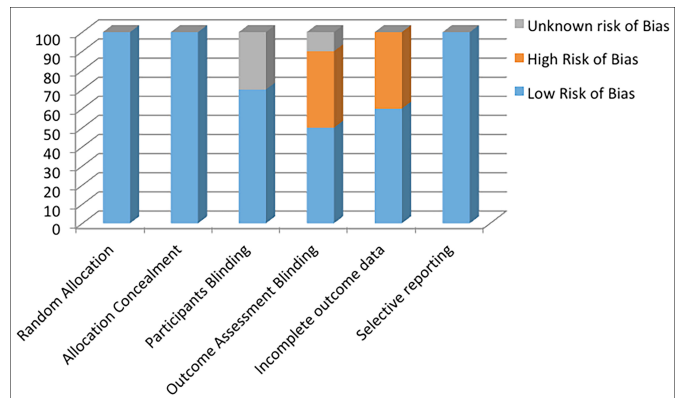


Figure 4: Represents risk of bias.

DISCUSSION

The analysis of the studies included in this review article has provided evidence that physical therapy-based management approaches incorporating newly devised techniques and combination therapies that have provided effective results as evaluated through the random effect model. The result of this review article has revealed an effect size of 0.470 (CI -1.991 to -0.145) suggesting a significant decrease in pain among all the subjects included in the literature review. Besides that, the impact of various physical therapy-based management approaches on decreasing the level of disability has also been reflected and has revealed an effect size of 0.511 (CI -2.001 to 0.00791) signifying a positive effect of physical therapy-based management approaches on disability as well. The findings of this study were according to the findings of some other reviews as well in which it has been observed that physical therapy-based management approaches were found to be effective in managing pain and disability.²² Besides, considering various randomised controlled trials in which two different physical therapy-based approaches have been used in managing pain and disability, the authors have reported significant findings, particularly in low back pain.^{23,24} Similarly, studies included in this meta-analysis elaborated the effects of modified evidence-based exercises regimes in managing pain and disability among SIJD patients. Combination of

therapies such as electrotherapy and mobilisation,²¹ manual therapy along with home program,¹³ pelvic floor exercises in combination with TENS, were all turned out to be more effective than individual therapies alone and the conventional physical therapy approaches. Likewise, application of kinesiotape (KT) alone was found to be more effective than sham KT and conventional exercises.^{15,17} Moreover, pelvic stabilisation exercises and MET exercises had also shown better results in reducing pain and lowering disability among SIJD patients.^{12,19} In a systematic review conducted to determine the effects of non-surgical management approaches for excessive pelvic tilt, the authors had observed no conclusive evidence thus, revealing that high-quality interventional studies are required for better findings.²⁵ On the contrary, this meta-analysis observed strong evidence of physical therapy-based management approaches in relieving pain and lowering the level of disability. Hence, it was suggested that physical therapy management must be incorporated as an independent or adjunct management approach for SIJD.

CONCLUSION

Physical therapy-based management approaches ranging from combining exercise therapy to MET and K-taping were found to be significantly effective than traditional approaches of combining electrotherapy and exercise approaches in managing pain and disability. Evidence-based physical therapy protocols are more effective than conventional physical therapy approaches. Therefore, these can be used as alternative and adjunct approaches to managing pain and disability among patients with SIJD.

COMPETING INTEREST:

The authors declared no competing interest.

AUTHORS' CONTRIBUTION:

SS: Conception and design of work.

SF, MAK: Analysis of data, drafting of work, and critical review.

AAK: Final approval of the manuscript.

FAK: Revision of the manuscript and questions related to integrity.

All the authors have approved the final version of the manuscript to be published.

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