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Effect of Application of Stretching Exercise versus Stretching Exercise and Natural Method on Pain and Functional Disability among Patients with Sacroiliac Joint Dysfunction

Rasha Ali Ahmed Abdelmowla[1], Mohamed Abd El-Radi Abd El-Salam[2], Safaa R. Osman[3], Anaam Mohamed Hassan[4] & Hanan Ali Ahmed Abdelmowla[5]

[1] Assistant Professor of Medical- Surgical Nursing, Faculty of Nursing, Assiut University, Egypt.
[2] Assistant Professor of Orthopedic Surgery and Traumatology, Faculty of Medicine, Assiut University, Egypt.
[3] Assistant Professor of Community Health Nursing, Faculty of Nursing, Assiut University, Egypt.
[4] Fellow of Medical-Surgical Nursing, Assiut University Hospital, Assiut, Egypt
[5] Lecturer of Medical-Surgical Nursing, Faculty of Nursing, Assiut University, Egypt.

Abstract

Background: Sacroiliac joint dysfunction frequently contributes to low back pain, causing significant discomfort and functional disability. **Aim:** This study aimed to evaluate the effect of application of stretching exercise versus stretching exercise and natural method on pain and functional disability among patients with sacroiliac joint dysfunction. **Methods:** Research design: A comparative, non-randomized quasi-experimental design. Setting and sampling: The study was conducted in the orthopedic department and outpatient clinic at Assiut University Hospitals, involving 290 non-randomized patients divided into two groups: group A (145 patients) received stretching exercises and natural method (massage with warm coconut oil), while group B (145 patients) performed only stretching exercises. Both groups received illustrated brochures and participated in a six-month intervention. Tools: Patients' assessment form, numeric pain rating scale, Quebec back pain disability scale and Oswestry disability index. **Results**: Patients' ages ranged from 20 to 58 years, with a predominance of females (group A: 73.1%; group B: 71.7%). Although both groups showed significant improvements in pain reduction and functional capacity, group A demonstrated statistically more substantial improvement ($p < 0.01$) in both pain reduction and functional capacity than group B. **Conclusion**: Incorporating natural method with stretching exercises may provide superior outcomes in managing pain and functional disability in patients with sacroiliac joint dysfunction. **Recommendation:** It is recommended to integrate natural methods alongside stretching exercises for managing sacroiliac joint dysfunction, as this combination can enhance pain relief and improve functional capacity.

Keywords: Functional disability, Natural method, Pain, Sacroiliac joint dysfunction & Stretching exercise

Introduction

Sacroiliac joint dysfunction is a prevalent cause of lower back and pelvic pain, affecting individuals' daily activities and overall quality of life. Sacroiliac joint dysfunction occurs when the sacroiliac joints, which connect the lower spine to the pelvis, become inflamed or dysfunctional. This condition can result from various factors, including trauma, abnormal motion patterns, or degenerative changes **(Barros et al., 2019)**.

The management of sacroiliac joint dysfunction poses a significant challenge due to the complexity of the joint's biomechanics and its critical role in load transfer between the spine and lower extremities. Traditional treatment methods for sacroiliac joint dysfunction range from pharmacological interventions, such as nonsteroidal anti-inflammatory drugs and corticosteroid injections, to surgical procedures in severe cases. However, these treatments often come with potential side effects and risks, prompting the need for safer, non-invasive alternatives **(Kiapour et al., 2020)**.

One promising approach to managing sacroiliac joint dysfunction is the use of stretching exercises. Stretching can help improve the flexibility of the muscles and ligaments surrounding the sacroiliac joints, thereby reducing pain and enhancing functional mobility. Regular stretching exercises can alleviate muscle tension, promote better posture, and increase the range of motion, contributing to overall joint health **(Lee et al., 2022)**.

In addition to stretching exercises, incorporating natural methods such as heat therapy, massage, and acupuncture has gained attention as a holistic approach to managing sacroiliac joint dysfunction. These complementary therapies can enhance the benefits of stretching by addressing inflammation, improving blood circulation, and reducing muscle spasms. The combination of stretching exercises and natural methods may offer a synergistic effect, providing more comprehensive pain relief and functional improvement **(Liu et al., 2022)**.

Education is a fundamental aspect of nursing care, particularly for patients with chronic conditions like

sacroiliac joint dysfunction. Nurses are tasked with delivering clear and concise information about the condition, emphasizing the importance of stretching exercises and the advantages of integrating natural methods, such as heat therapy and massage. This educational approach empowers patients to actively participate in their recovery by equipping them with the knowledge and techniques needed for effective self-care **(Trager et al., 2024)**.

Empowering patients is vital for improving their overall health status. Patient education encompasses conveying essential information about the condition and its symptoms, as well as highlighting the necessity of adhering to prescribed treatment regimens. Through compassionate and effective communication, healthcare professionals enable patients to understand the benefits of therapeutic interventions, which include exercise-based strategies and natural remedies designed to enhance flexibility and alleviate muscle tension surrounding the sacroiliac joint **(Si et al., 2023)**.

Significance of the study

Sacroiliac joint dysfunction is a prevalent source of low back pain, affecting a significant portion of the population, with estimates suggesting that up to 25% of individuals with chronic low back pain may have this condition **(Wieczorek et al., 2021)**. With the condition high prevalence, there is a critical need for effective, non-invasive management strategies that improve patient outcomes without over-reliance on medications or surgery. This study aimed to demonstrate the benefits of integrating exercise with natural method; massage with warm coconut oil in managing sacroiliac joint dysfunction. This approach has the potential to provide holistic and evidence-based alternatives that are both effective and safer for patients and highlight the vital role of nursing in empowering patients through education, personalized care plans, and encouragement of self-management techniques. In addition, the study aimed to have research implications by laying a foundation for future investigations on integrative care approaches.

Aim of the study

This study aimed to evaluate the effect of application of stretching exercise versus stretching exercise and natural method on pain and functional disability among patients with sacroiliac joint dysfunction.

Research hypotheses

1. The application of stretching exercises combined with natural method (group A) would reduce pain in patients with sacroiliac joint dysfunction more than the application of stretching exercises alone (group B).
2. The application of stretching exercises combined with natural method (group A) would reduce functional disability in patients with sacroiliac joint dysfunction more than the application of stretching exercises alone (group B).
3. The application of stretching exercises combined with natural method (group A) would improve functional level in patients with sacroiliac joint dysfunction more than the application of stretching exercises alone (group B).

Methods

Study design

A comparative study using a non-randomized quasi-experimental research design.

Study variables

The independent variable was the educational brochure while the dependent variables were pain, functional status and disability.

Study setting

This study was conducted in orthopedic department and outpatient clinic at Assiut University Hospitals. The orthopedic department is equipped with specialized healthcare professionals and facilities dedicated to diagnosing and treating musculoskeletal disorders, including conditions affecting the sacroiliac joint. The outpatient clinic provides accessible care for patients who do not require overnight hospitalization, allowing for ongoing management and follow-up of their conditions.

The choice of Assiut University Hospitals as the study setting is based on several factors: expertise and specialization, diverse patient population, availability of resources and integration of care. Selecting this setting aligns with the study's objectives, ensuring that the research is conducted in an environment conducive to both patient care and academic inquiry.

Sample

The study included a non-randomized sample of both genders, aged 20 to 58 years, who had been diagnosed with sacroiliac joint dysfunction. Patients were divided into two groups: the first 145 patients constituted group A, while the subsequent 145 patients were classified as group B. Group A received a specific set of seven stretching exercises in addition to a natural method involving massage with warm coconut oil. Group B received only the seven stretching exercises. Patients with a history of spinal surgery, inflammatory joint diseases as rheumatoid arthritis, history of recent trauma or fracture to the pelvis or spine, pregnant or breast feeding women, currently undergoing other forms of physical therapy, severe osteoporosis or other conditions that contraindicate stretching exercises were excluded from the study.

Sample size:

The sample size for this study was determined using **Thompson's 2012** equation, with a 95% confidence

level and a 5% margin of error. A property availability ratio of 50% was assumed, representing the proportion of the population with the characteristic of interest. Based on these parameters, a minimum of 290 patients was required to ensure statistically reliable results, minimizing sampling error and strengthening the study's robustness.

Data collection tools

Four tools were utilized to collect data in this study:

I. Patients' assessment form:

This form was developed by the researchers and involved several components:

a) **Demographic information:** age, gender, educational level, marital status, and occupation.
b) **Medical data:** diagnosis, body mass index (BMI) and clinical symptoms.

II. Numeric pain rating scale

This scale adopted from **McCaffery & Beebe, (1989**). It is utilized to assess pain levels/intensity. Patients are asked to rate their pain on a scale ranging from "0 to 10," where "0" represents no pain, and "10" signifies the worst pain imaginable. Pain scores are categorized as follows: 0 for no pain, 1-3 for mild pain, 4-6 for moderate pain, and 7-10 for severe pain.

III. Quebec back pain disability scale (QBPDS)

It adopted from **Kopec et al., (1995)**. It is a self-administered instrument comprising 20 items, focuses on specific disability related to back pain. It is designed specifically to assess the impact of back pain on daily activities (difficulty level in performing daily activities). Each item corresponds to a daily activity that may pose challenges for someone suffering from back pain. Patients rate the difficulty of each activity on a scale from 0 to 5, where 0 indicates "not difficult at all" and 5 signifies "unable to do." The overall score is obtained by summing the scores for all 20 items, yielding a range from 0 to 100. Higher total scores reflect more severe disability.

IV. Oswestry disability index (ODI)

It adopted from **Fairbank & Pynsent, (2000)**. It is a widely used tool to assess how back pain affects various aspects of life. It provides a broader assessment of overall disability. It consists of 10 domains or sections covering various aspects of life, including pain intensity, personal care, lifting, walking, sitting, standing, sleeping, social life, traveling, and employment/homemaking. Each domain is scored from 0 to 5, with 0 indicating no disability and 5 indicating maximum disability. Patients select the statement in each domain that best reflects their level of impairment. The total score is calculated by summing the scores for all domains, with the maximum possible score being 50 indicating higher level of disability.

Procedure

The present study progressed through the following:

Preparatory phase

The development of tools involved a literature review to adopt data collection instruments **(McCaffery & Beebe, 1989; Kopec et al., 1995; Fairbank & Pynsent, 2000)**.

Preparation of resources:

The research team customized the training environment and educational materials to suit the patients' needs, which included visual aids such as pictures in an educational brochure. Furthermore, they scheduled session according to the content outlined in the educational brochure and considering the available time.

Validity of study tools:

It validated by panel of expert (two staff from medical-surgical nursing field, one orthopedic surgeon and two staff of community health nursing).

The numeric pain rating scale has demonstrated robust concurrent validity in comparison to other pain assessment tools like the visual analog scale (VAS) and verbal rating scale, showing a high correlation (r = 0.91) with VAS scores **(Hawker et al., 2011)**.

Moderate evidence suggests that the English version of the QBPDS exhibits positive construct validity when compared to the short-form 36 questionnaire. Correlations between QBPDS scores and VAS pain ranged from 0.37 to 0.87 **(Speksnijder et al., 2016)**.

The ODI has been recognized as a valid tool for assessing disability related to low back pain. Significant correlations found between ODI scores and VAS pain intensity (r = 0.67) as well as Roland-Morris disability questionnaire score (r = 0.71) **(Joshi et al., 2013)**.

Reliability of study tools:

The numeric pain rating scale demonstrated excellent test-retest reliability with intraclass correlation coefficients 0.95 **(Alghadir et al., 2018)**.

The English version of the QBPDS showed moderate support for positive internal consistency, with Cronbach's alpha values ranging from 0.89 to 0.96 **(Speksnijder et al., 2016)**.

For the English version of the ODI, test-retest reliability, as measured by the intraclass correlation coefficient, was found to be 0.877 and 0.943 **(Joshi et al., 2013)**.

Ethical considerations:

Before initiating the study, formal approval was obtained from the head of the orthopedic department at Assiut University Hospitals. This preparatory/initial step was crucial for establishing the study's foundation and ensuring compliance with institutional protocols.

The study received ethical approval from the Faculty of Nursing Research Ethical Committee, with the ethical code [1120220433] on 21-9-2022. Patients informed of their right to decline

participation/withdraw at any point. Assurances regarding the confidentiality of all data were provided, and privacy was strictly maintained. Before data collection, the study's objectives were clearly explained to each patient, and oral consent for participation was obtained from all participants.

Pilot study:

It was a crucial preparatory phase aimed at optimizing the efficiency and clarity of methods of data collection. It enabled the identification and resolution of potential challenges in study tools before expanding to full study sample. This iterative refinement process enhanced overall quality/reliability of the study outcomes and lead to successful application of the main study. With a sample size of 30 patients (15 from each group, constituting 10% of the total sample), the pilot study played a critical role in ensuring effectiveness/practicality of the study tools. Minor modifications were made based on feedback from the pilot study. The duration and frequency of the stretching exercises were adjusted to better suit the participants' capabilities and enhance their effectiveness. Additionally, some medical terminology was made simpler to guarantee that patients could comprehend and respond accurately. Participants involved in the pilot study were not included in the overall sample of the study, enhancing the methodological rigor and success of the research endeavor.

Fieldwork description:

The study involved data collection from October 2022 to October 2023, within the orthopedic department and outpatient clinic of Assiut University Hospitals. Furthermore, 6-month follow-up period was integrated, extending until April 2024 to evaluate outcome.

Assessment phase

The study involved the recruitment of patients from the orthopedic department and outpatient clinic. The researchers presented themselves and established communication with the patients.

Patients were briefed about the study purpose and nature, and their consent was sought. Subsequently, baseline assessments were conducted individually for all patients, focusing on collecting demographic and medical details using (Tool I).

Alongside baseline assessments, patients' pain levels/intensity were measured using the numeric pain rating scale (Tool II). The specific impact of back pain on daily functional abilities (difficulty level in performing daily activities) was measured using QBPDS (Tool III), and the effect of back pain on various aspects of life (functional disability) was measured using ODI (Tool IV).

Implementation phase

Upon completion of the assessment, the researchers proceeded to provide the educational brochure during a single session. Researchers met with each patient for 1-1.30 hour to conduct the session. The session was held in a designated room within the orthopedic department and the outpatient clinic to ensure a comfortable and private environment conducive to learning and interaction. Patients were met individually to provide personalized attention and address their specific needs effectively. This one-on-one approach allowed researchers to tailor the educational content to each patient's understanding and circumstances, enhancing the overall effectiveness of the intervention. The researchers distributed an educational brochure during a single session.

Educational Brochure:

Patients in groups A and B received personalized educational session. This session was conducted in a conversational, training, and guidance style, customized to meet the individual needs of each patient. Topics covered during the session included:

In-person Educational Session:

Objective: Equip patients with the knowledge and skills for practicing seven specific stretching exercises (groups A and B) and applying natural warm coconut oil massage (group A) to enhance their active participation in their own care and overall health improvement.

Duration: 1-1.30 hour.

Content: Educated and guided patients with sacroiliac joint dysfunction on practicing seven targeted stretching exercises (applicable to both groups A and B) and utilizing a natural method (massage with warm coconut oil) specific to group A.

Targeted stretching exercises can significantly reduce or even eliminate sacroiliac joint pain by improving flexibility, stretch, balance, and stability. For best results, perform this routine two to five times daily.

Stretching exercises

1. **Double knee hug (30 second):**

This stretch helps relax the muscles in lower back, glutes, and hips, alleviating tension on the sacroiliac joint.

2. **Lower trunk rotation (10 second per side):**

This stretch enhances movement and flexibility in the hips and lower back, aiding in the relief of pressure on the sacroiliac joint.

3. **Bridge (30 second):**

This stretch alleviates tension in hip flexors while strengthening muscles surrounding the sacroiliac joint, including glutes, outer hips, and lower back.

4. **Supine (30 second per side):**

This stretch eases tension in piriformis muscle, which can irritate the sacroiliac joint when tight.

5. **Cow face legs (30 second per side):**

This stretch alleviates tension in glutes, hips, and lower back, helping to reduce tightness in the sacroiliac joint.

6. **Child's Pose (30 second):**

It alleviates tension in the sacroiliac joint by loosening glutes, hips, and lower back.

7. **The tensor fasciae latae wall stretch (30 second per side):**

Stretch this muscle which located on the outer thigh that connects to the iliotibial band helping to maintain pelvic balance while standing, walking, or running. When this muscle is tight, it can cause a pelvic shift, resulting in sacroiliac joint pain.

Teaching Media: Provided patients with printed educational brochure featuring illustrated pictures of the seven stretching exercises, and used phone media (videos) as needed (for both groups A and B). Additionally, patients in group A received an extra educational brochure detailing the components, importance, and usage of the natural method (warm coconut oil) for sacroiliac joint massage (2-3 times per day).

Evaluation phase

After three and six months, patients attended scheduled follow-up appointments at the orthopedic department outpatient clinic. During these visits, sacroiliac joint dysfunction symptoms were evaluated using (tool I, part b), patients' pain levels/intensity were measured using the numeric pain rating scale (Tool II). The specific impact of back pain on daily functional abilities (difficulty level in performing daily activities) was measured using QBPDS (Tool III), and the effect of back pain on various aspects of life (functional disability) was measured using ODI (Tool IV).

Statistical analysis

The data was revised, prepared for computer entry, coded, analyzed, and tabulated. Version 26.0 of SPSS was used to perform descriptive and correlation statistics, including frequencies and percentages, means and standard deviations, Pearson correlation, t-test, and one-way ANOVA to compare between both groups. A p-value below 0.05 was deemed to indicate statistical significance.

Results

Table (1): Demographic data of patients with sacroiliac joint dysfunction

Items	Group A (n=145)		Group B (n=145)		F-test	P-value
	No.	%	No.	%		
Age (years)					0.000	0.988
20– 30	38	26.2	41	28.3		
31 – 40	77	53.1	75	51.7		
41 – 50	13	9.0	14	9.7		
> 50	17	11.7	15	10.3		
Mean ± SD (range)	**35.4 ± 9.8 (20-58)**		**35.1 ± 9.7 (20-58)**			
Gender:					0.274	0.601
Male	39	26.9	41	28.3		
Female	106	73.1	104	71.7		
Body mass index:					0.292	0.589
Normal	16	11.0	17	11.7		
Overweight	81	55.9	77	53.1		
Obese	48	33.1	51	35.2		
Occupation:					0.026	0.873
Manual work	40	27.6	38	26.2		
Office work	38	26.2	36	24.8		
Hard work	51	35.2	56	38.6		
Not working	16	11.0	15	10.3		
Level of education:					0.003	0.960
Illiterate	4	2.8	3	2.1		
Read and write	12	8.3	11	7.6		
Primary education	14	9.7	13	9.0		
Prep education	47	32.4	44	30.3		
Secondary education	34	23.4	36	24.8		
University education	34	23.4	38	26.2		
Marital status:					0.943	0.332
Single	21	14.5	24	16.6		
Married	124	85.5	121	83.4		

Independent sample T-test *No statistical significant differences (p > 0.05)*

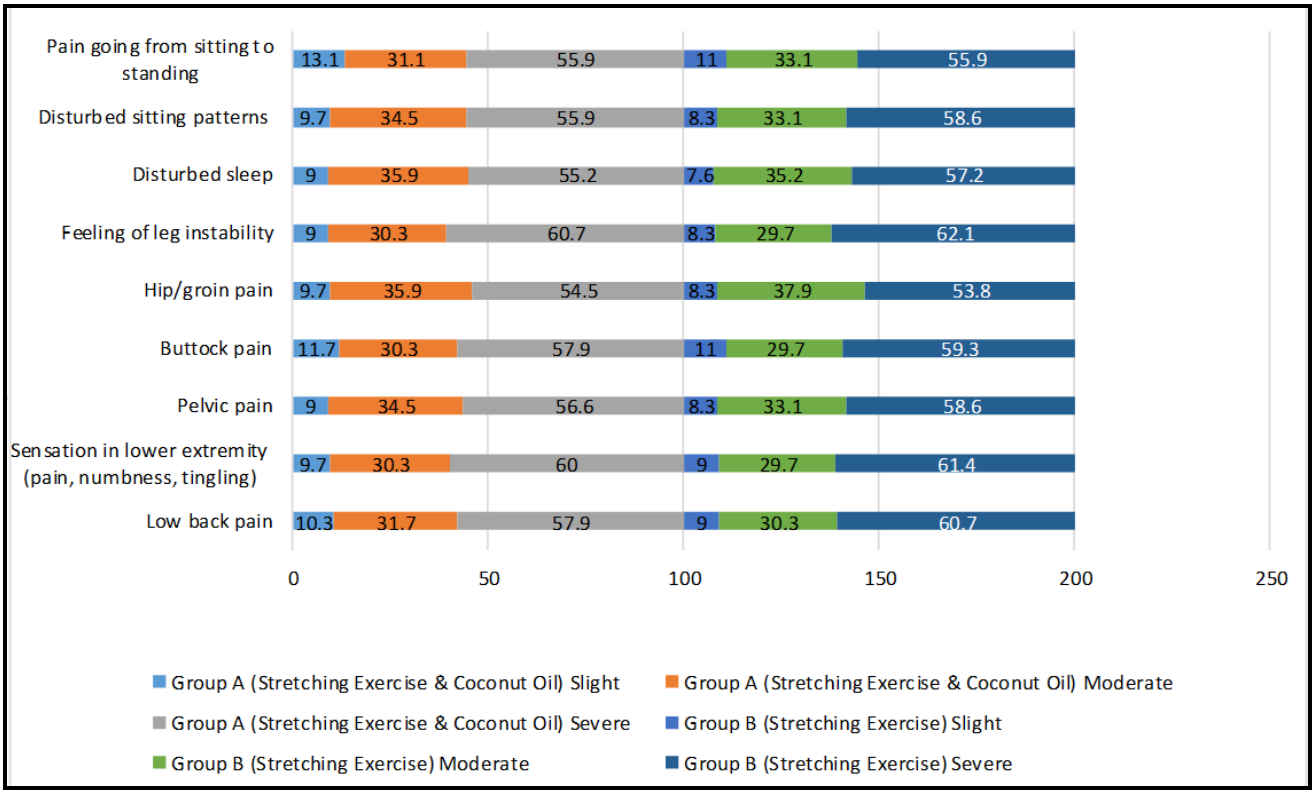

Figure (1): Initial assessment for symptoms of sacroiliac joint dysfunction among the studied patients

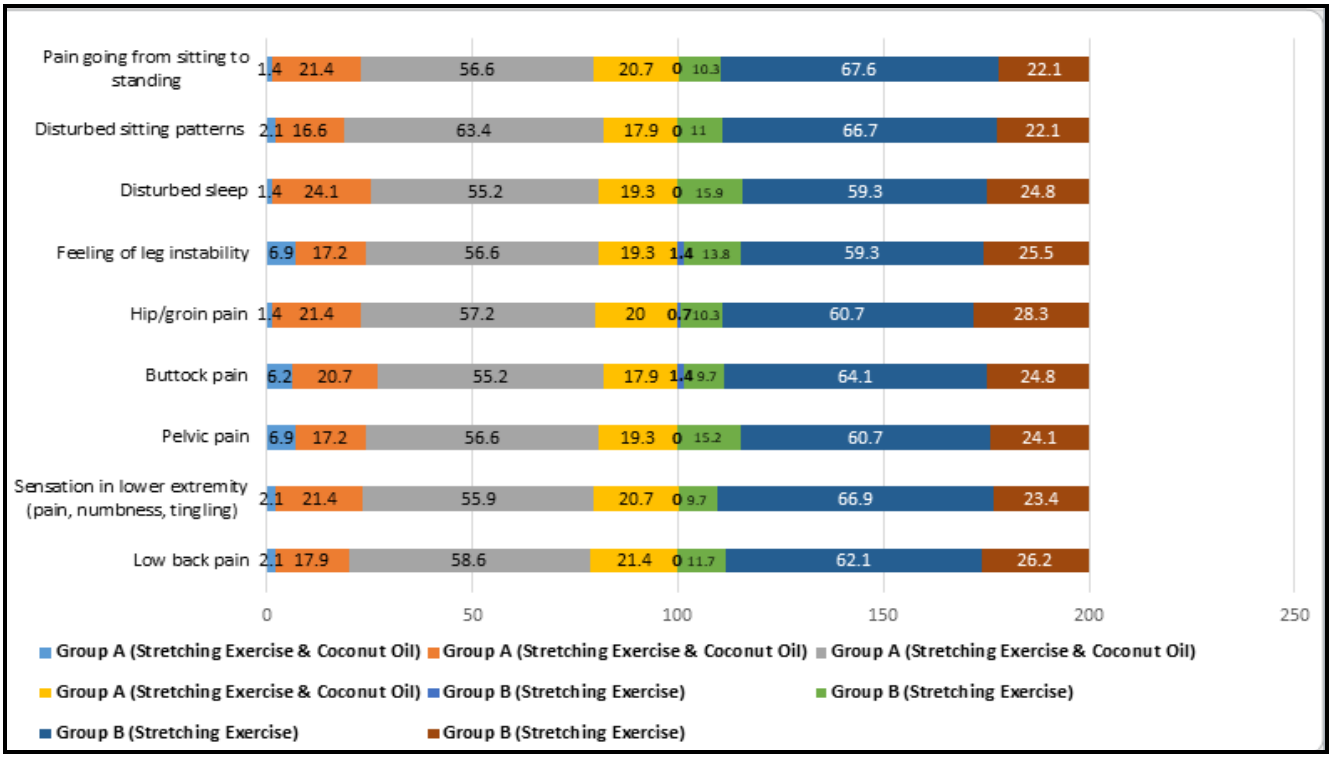

Figure (2): Symptoms of sacroiliac joint dysfunction among the studied patients after 3 months of intervention

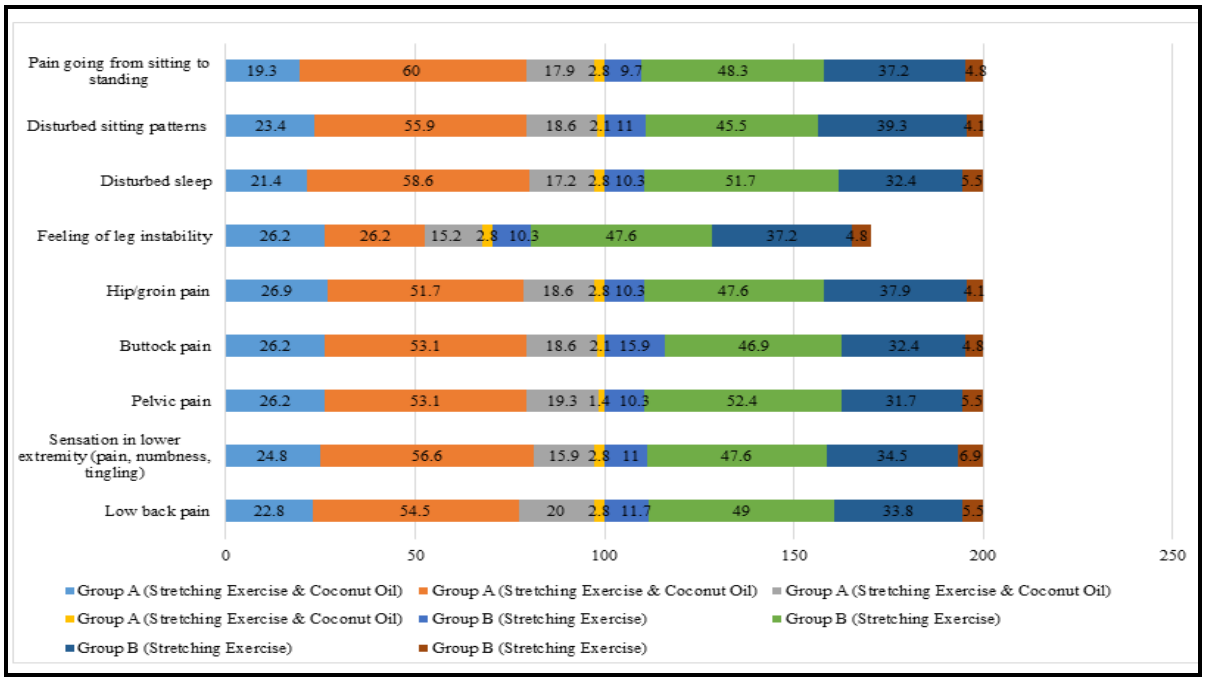

Figure (3): Symptoms of sacroiliac joint dysfunction among the studied patients after 6 months of intervention

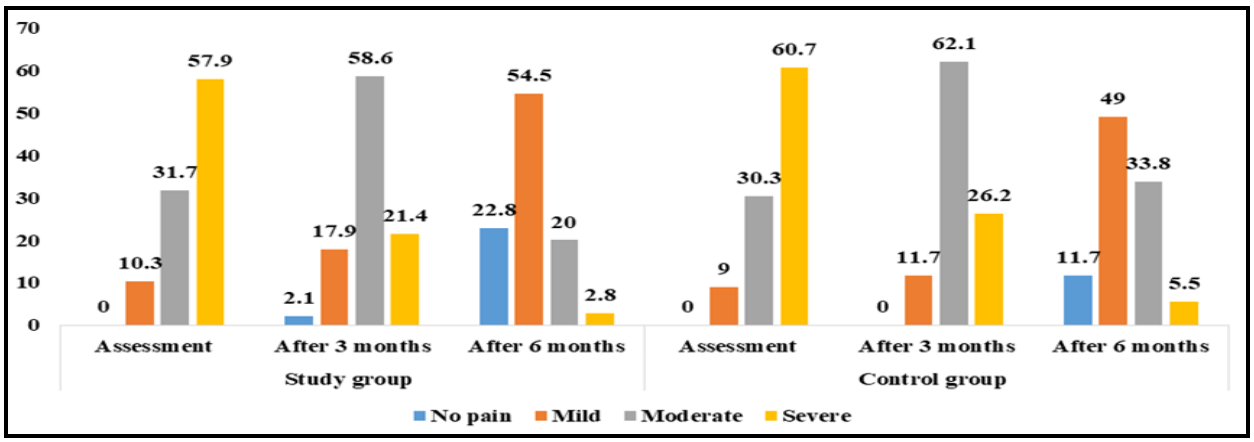

Figure (4): Pain levels/intensity among the studied patients (numeric pain rating scale) before and after 3 and 6 months of intervention

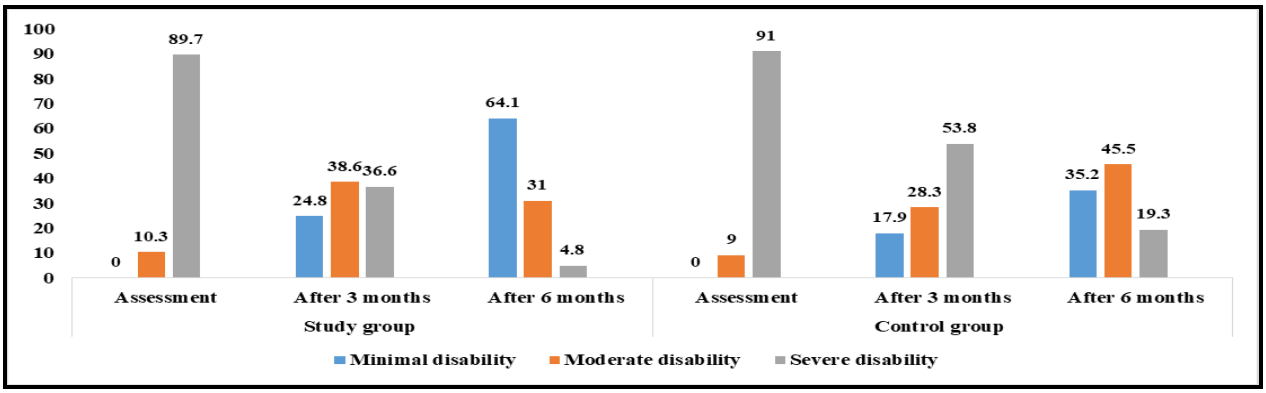

Figure (5): Functional disability levels among studied patients (Oswestry disability index) before and after 3 and 6 months of intervention

Table (2): Distribution of studied groups by degree of difficulty in performing daily activities (Quebec back pain disability scale)

Table (2a): Distribution of studied groups by degree of difficulty in performing daily activities (Quebec back pain disability scale) at assessment

Items	Quebec back pain disability scale																				P-value
	Study group (N=145) Assessment										Control group (N=145) Assessment										
	Not difficult		Minimally difficult		Fairly difficult		Very difficult		Unable to do		Not difficult		Minimally difficult		Fairly difficult		Very difficult		Unable to do		
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	
Bed/rest	0	0.0	0	0.0	14	9.7	45	31.0	86	59.3	0	0.0	0	0.0	13	9.0	43	29.7	89	61.4	0.708
Sitting/standing	0	0.0	16	11.0	43	29.7	86	59.3	0	0.0	0	0.0	15	10.3	42	29.0	88	60.7	0	0.0	0.764
Ambulation	0	0.0	12	8.3	51	35.2	82	56.6	0	0.0	0	0.0	10	6.9	50	34.5	85	58.5	0	0.0	0.543
Movement	0	0.0	14	9.7	45	31.0	86	59.3	0	0.0	0	0.0	13	9.0	43	29.7	89	61.4	0	0.0	0.708
Bending/stooping	0	0.0	16	11.0	43	29.7	86	59.3	0	0.0	0	0.0	15	10.3	42	29.0	88	60.7	0	0.0	0.764
Handling of large/heavy objects	0	0.0	13	9.0	49	33.8	83	57.2	0	0.0	0	0.0	11	7.6	47	32.4	87	60.0	0	0.0	0.518

Independent sample T-test *No statistical significant differences (p > 0.05)*

Table (2b): Distribution of studied groups by degree of difficulty in performing daily activities (Quebec back pain disability scale) after 3 months of intervention

Items	Quebec back pain disability scale																				P-value
	Study group (N=145) After 3 months										After 3 months Control group (N=145)										
	Not difficult		Minimally difficult		Fairly difficult		Very difficult		Unable to do		Not difficult		Minimally difficult		Fairly difficult		Very difficult		Unable to do		
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	
Bed/rest	5	3.4	25	17.2	84	57.9	31	21.4	0	0.0	1	0.7	17	11.7	89	61.4	38	26.2	0	0.0	0.047*
Sitting/standing	11	7.6	29	20.0	79	54.5	26	17.9	0	0.0	3	2.1	14	9.7	92	63.4	36	24.8	0	0.0	0.026*
Ambulation	4	2.8	34	23.4	79	54.5	28	19.3	0	0.0	1	0.7	22	15.2	86	59.3	36	24.8	0	0.0	0.028*
Movement	5	3.4	25	17.2	84	57.9	31	21.4	0	0.0	1	0.7	17	11.7	89	61.4	38	26.2	0	0.0	0.047*
Bending/stooping	11	7.6	29	20.0	79	54.5	26	17.9	0	0.0	3	2.1	14	9.7	92	63.4	36	24.8	0	0.0	0.005**
Handling of large/heavy objects	5	3.4	23	15.9	91	62.8	26	17.9	0	0.0	1	0.7	16	11.0	96	66.2	32	22.1	0	0.0	0.046*

Independent sample T-test ** Statistical significant differences (p < 0.05)*

Table (2c): Distribution of studied groups by degree of difficulty in performing daily activities (Quebec back pain disability scale) after 6 months of intervention

Items	Quebec back pain disability scale																				P-value
	Group A (N=145) After 6 months										Group B (N=145) After 6 months										
	Not difficult		Minimally difficult		Fairly difficult		Very difficult		Unable to do		Not difficult		Minimally difficult		Fairly difficult		Very difficult		Unable to do		
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	
Bed/rest	35	24.1	78	53.8	28	19.3	4	2.8	0	0.0	19	13.1	70	48.3	48	33.1	8	5.5.	0	0.0	0.010**
Sitting/standing	37	26.9	77	53.1	15	17.9	3	2.1	0	0.0	24	16.6	67	46.2	47	32.4	7	4.8	0	0.0	0.014**
Ambulation	33	22.8	83	57.2	25	17.2	4	2.8	0	0.0	17	11.7	74	51.0	46	31.7	8	5.5	0	0.0	0.003**
Movement	35	24.1	78	53.8	28	19.3	4	2.8	0	0.0	19	13.1	70	48.3	48	33.1	8	5.5	0	0.0	0.010**
Bending/stooping	39	26.9	77	53.1	26	17.9	3	2.1	0	0.0	24	16.6	67	46.2	47	32.4	7	4.8	0	0.0	0.014**
Handling of large/heavy objects	36	24.8	79	54.5	27	18.6	3	2.1	0	0.0	18	12.4	65	44.8	65	38.6	6	4.1	0	0.0	0.004**

Independent sample T-test ** Statistical significant differences (p < 0.01)*

Table (3): Pearson correlation among studied groups for numeric pain rating scale, Quebec back pain disability scale, and Oswestry disability index

Period	Scales		Numeric pain rating scale	Quebec back pain disability scale	Oswestry disability index
Assessment	**Numeric pain rating scale**	**Pearson Correlation**	1	0.930**	0.607**
		Sig.	-	0.0001	0.0001
		N	290	290	290
	Quebec back pain disability scale	**Pearson Correlation**	0.930**	1	0.618**
		Sig.	0.0001	-	0.0001
		N	290	290	290
	Oswestry disability index	**Pearson Correlation**	0.607**	0.618**	1
		Sig.	0.0001	0.0001	-
		N	290	290	290
After 3 months	**Numeric pain rating scale**	**Pearson Correlation**	1	0.915**	0.150*
		Sig.	-	0.0001	0.010
		N	290	290	290
	Quebec back pain disability scale	**Pearson Correlation**	0.915**	1	0.167**
		Sig.	0.0001	-	0.004
		N	290	290	290
	Oswestry disability index	**Pearson Correlation**	0.150*	0.167**	1
		Sig.	0.010	0.004	-
		N	290	290	290
After 6 months	**Numeric pain rating scale**	**Pearson Correlation**	1	0.912**	0.609**
		Sig.	-	0.0001	0.0001
		N	290	290	290
	Quebec back pain disability scale	**Pearson Correlation**	0.912**	1	0.597**
		Sig.	0.0001	-	0.0001
		N	290	290	290
	Oswestry disability index	**Pearson Correlation**	0.609**	0.597**	1
		Sig.	0.0001	0.0001	-
		N	290	290	290

The correlation is significant at the 0.01 level

Table (1): This table reveals the demographic data of patients. More than half of the patients (53.1% in group A, 51.7% in group B) were between 31 and 40 years old. Most of them were female (73.1% in group A and 71.7% in group B). Moreover, the majority of patients were married, with 85.5% in group A and 83.4% in group B. There were no statistically significant differences in the demographic characteristics of patients between the groups A and B (p. value >0.05).

Figure (1): This figure illustrates symptoms of sacroiliac joint dysfunction at assessment. Less than two thirds of group A (60.0%, 60.7%, 57.9%) had severe sensation in lower extremity (pain, numbness, tingling), feeling of leg instability and low back pain, respectively. While, in group B the most prevalent symptoms were feeling of severe leg instability (62.1%), severe sensation in lower extremity (pain, numbness, tingling) (61.4%), and severe low back pain (60.7%). There were no statistically significant differences in the severity of sacroiliac joint dysfunction symptoms between the two groups (p. value >0.05).

Figure (2): This figure illustrates symptoms of sacroiliac joint dysfunction after 3 months of intervention. There was improvement in the symptoms after 3 months of intervention. Only fifth of group A (20.7%, 20.0%, 20.7%) had severe sensation in lower extremity (pain, numbness, tingling), hip/groin pain and pain going from sitting to standing**,** respectively. while, in group B two thirds of them had moderate sensation in lower extremity

(pain, numbness, tingling) (66.9%), moderate disturbed sitting patterns (66.7%), and moderate pain going from sitting to standing (67.6%). There were no statistically significant differences (p. value >0.05) in the severity of sacroiliac joint dysfunction symptoms between group A and B except in pelvic pain and buttock pain (p. value =0.036, 0.011) respectively.

Figure (3): This figure illustrates symptoms of sacroiliac joint dysfunction after 6 months of intervention. Only 2.8% of group A had severe low back pain, sensation in lower extremity (pain, numbness, tingling), hip/groin pain, feeling of leg instability and disturbed sleep. While, in group B 5.5%, 6.9%, 4.1%, 4.8%, and 5.5% had the same symptoms respectively. There were statistically significant differences in the severity of sacroiliac joint dysfunction symptoms between group A and B (p. value =0.036, 0.011) respectively.

Figure (4): This figure illustrates pain levels/intensity among the studied patients (numeric pain rating scale) before and after 3 and 6 months of intervention. More than half of patients in group A (57.9%) had severe pain in the assessment phase pre-intervention versus 60.7% in group B. Moreover, post 3 months of intervention 58.6% of them had moderate pain versus 62.1% in group B. After 6 months, 54.5% of the studied patients had mild pain versus 49.0% in group B. Also, there was statistically significant difference between degree of pain in both groups after 6 months of intervention (p value= 0.014).

Figure (5): This figure illustrates functional disability levels among studied patients (ODI) before and after 3 and 6 months of intervention. The majority of patients in group A (89.7%) had severe disability in the assessment phase pre-intervention versus 91% in group B. Moreover, after 3 months of intervention 36.6% of them had severe disability versus 53.8% in group B. After 6 months, 4.8% of patients in group A had severe disability versus 19.3% in group B. Also, there was no statistically significant difference regarding ODI in both groups in assessment phase (p value= 0.428) while there was highly statistical significant difference after 3 and 6 months of intervention (p value= 0.021, 0.001) respectively.

Table (2a): This table shows the degree of difficulty in performing daily activities (QBPDS) at assessment. Initial assessment show that both groups experienced significant difficulty in performing daily activities, with no statistically significant differences between them ($p > 0.05$). Most patients (59.3% of group A and 61.4% of group B) found both bed/rest and movement very difficult or were unable to do it ($p = 0.708$). The majority of patients in both groups rated sitting/standing as very difficult, with 59.3% in group A and 60.7% in group B ($p = 0.764$). Over half of patients reported ambulation as very difficult (56.6% in group A and 58.5% in group B) ($p =0.543$). Bending/stooping rated as very difficult by 59.3% of group A and 60.7% of group B ($p =0.764$). The majority found handling large/heavy objects very difficult (57.2% in group A and 60.0% in group B) ($p =0.518$).

Table (2b): This table shows the degree of difficulty in performing daily activities (QBPDS) after 3 months of intervention. After 3 months, group A showed significant improvements in performing daily activities compared to group B, with statistical significance in all points of QBPDS ($p < 0.05$), demonstrating the effectiveness of the intervention. Group A showed significant improvement in bed/rest, with only 21.4% finding the activity very difficult compared to 61.4% in group B ($p = 0.047$). Group A reported a reduction in difficulty with sitting/standing, with 17.9% indicating very difficult compared to 63.4% in group B ($p = 0.026$). Group A experienced better outcomes in ambulation, with 19.3% finding it very difficult, significantly less than 59.3% in group B ($p = 0.028$). The proportion of patients finding movement very difficult dropped to 21.4% in group A, compared to 61.4% in group B ($p = 0.047$). A notable improvement was observed in group A in bending/stooping, where only 17.9% found it very difficult compared to 63.4% in group B ($p = 0.005$). The difficulty in handling large/heavy objects decreased significantly in group A, with 17.9% indicating very difficult compared to 66.2% in group B ($p = 0.046$).

Table (2c): This table shows the degree of difficulty in performing daily activities (QBPDS) after 6 months of intervention. Only 2.8% of group A faced severe difficult in bed/rest, ambulation, and movement after 6 months from intervention, while 5.5% of group B had the same difficult. There is highly statistical difference between group A and B after 6 months regarding all points of QBPDS (p. value < 0.01).

Table (3): This table shows strong positive correlation between patients' scores regarding numeric pain rating scale, QBPDS and ODI. The correlation is significant at the 0.01 level.

Discussion

The sacroiliac joint dysfunction has been found to be the primary culprit for lower back pain, but it is still overlooked and treated as lower back pain. There are no guidelines or appropriate therapeutic protocols for the sacroiliac joint dysfunction. Although their effects have been discussed in several studies, the superiority of one over the other for patients with sacroiliac joint dysfunction is still unclear **(Kamali et al., 2019; Nejati et al., 2019)**.

This study revealed that in each group (A and B), more than half of the patients were between thirty-one to forty years old. Most of them were women. Moreover, the majority of patients were married. There were no statistically significant differences in the demographic characteristics of the patients between group A and B.

Similarly, the current results align with the findings of study conducted in Istanbul Hospital by **Dogan et al., (2021)** who conducted a study on patients with sacroiliac joint dysfunction. In this study, participants were divided into two groups, revealing that the age ranges were comparable between the exercise (thirty-five thirteen) and mobilization (thirty-nine eleven) groups. Additionally, the BMI values were similar in both groups, and there was a notable predominance of female participants. Importantly, no statistical differences were identified between the two groups, which support the consistency of the current study findings.

From the researchers' perspective, these findings suggest that sacroiliac joint dysfunction may commonly affect individuals in their thirty and forty years, an age range that is likely associated with increased physical demands and stress on the joints, which could explain the higher incidence of sacroiliac joint dysfunction. The predominance of women in the sample may reflect gender-specific factors such as hormonal influences, pregnancy, or anatomical differences that make women more prone to developing sacroiliac joint dysfunction. Additionally, the high percentage of married patients might imply that sacroiliac joint dysfunction could impact individuals during a phase of life where familial and work responsibilities are prominent, potentially exacerbating the physical strain on the sacroiliac joints.

The present results indicate that over half of the patients in group A experienced severe pain during the initial assessment phase before the intervention, compared to less than two-thirds in group B as measured by the numeric pain rating scale. Following three months of intervention, more than half of group A reported moderate pain, whereas less than two-thirds of group B continued to experience higher pain levels. By the six-month follow-up, more than half of group A had transitioned to mild pain, in contrast to less than half of group B. Additionally, the study found no statistically significant differences in pain levels between group A and B during the initial assessment and at the three-month mark. However, a statistically significant difference emerged after six months of intervention, suggesting that the intervention may have a long-term impact on pain reduction.

These findings are consistent with study conducted in Shohadaye Tajrish Hospital by **Elyaspour et al., (2020)** who reported no significant difference in VAS levels between the two groups prior to treatment of sacroiliac joint dysfunction. However, after one week of treatment, the manipulation group showed significantly lower VAS levels compared to the exercise group, with these differences remaining statistically significant after one month.

The current results are supported with study of **Dogan et al., (2021)** who found that both the exercise and mobilization groups experienced significant reductions in sacroiliac pain levels, and VAS scores after treatment, one week later, and at the one-month follow-up. However, unlike Dogan's findings, which showed no significant differences between the two groups at the one-month follow-up, the present study demonstrated a statistically significant improvement after six months of intervention.

A study conducted in Government Hospitals of Faisalabad by **Khalid et al., (2022)** support the findings of the present study, indicating that there was no significant difference in pre-VAS scores between the two groups of patients with sacroiliac joint dysfunction. However, the post-management VAS scores showed significant improvement in both groups.

From the researchers' perspective, the findings indicate a noteworthy progression in pain levels among patients in group A over the course of the study. Initially, more than half of the patients experienced severe pain before the intervention, which is a significant indication of the impact of sacroiliac joint dysfunction on their different aspect of life. Post-intervention assessments revealed a shift towards moderate pain after three months, and by the six-month mark, the majority reported only mild pain. This gradual reduction in pain intensity suggests that the intervention may have been effective in managing symptoms over time.

The current study revealed that the majority of patients exhibited severe disability during the initial assessment phase prior to the intervention. After three months of intervention, more than one-third of group A continued to experience severe disability, while over half of group B maintained similar levels of impairment. By the six-month follow-up, only a small percentage of group A reported severe disability, in contrast to a higher proportion in group B. Additionally, the study found no statistically significant differences in ODI scores between group A and B during the initial assessment phase. However, there were highly significant differences observed after three and six months of intervention, indicating that the intervention had a substantial positive effect on reducing disability over time. These

findings highlight the potential for targeted interventions to reduce functional disability in patients with sacroiliac joint dysfunction.

These results align with those of **Elyaspour et al., (2020)** who found no significant difference in the severity of disability, as measured by the ODI, between the two groups prior to treatment of sacroiliac joint dysfunction. However, after one week of intervention, the manipulation group demonstrated a significantly lower mean ODI compared to the exercise group. Similar significant differences were also observed after one month.

Furthermore, the current study support the findings of **Khalid et al., (2022)** who reported no significant difference in the modified ODI between the two groups initially. Nevertheless, who identified a significant difference in the pre- and post-treatment scores of the modified ODI between the groups. These findings highlight the effectiveness of targeted interventions in improving disability outcomes among patients with sacroiliac joint dysfunction, reinforcing the importance of continued research in this area.

From the researchers' perspective, the findings highlight a significant improvement in disability levels among group A over the study period. Initially, a majority of patients exhibited severe disability, reflecting the substantial impact of sacroiliac joint dysfunction on daily functioning. The reduction in the percentage of patients experiencing severe disability after three months of intervention, from the initial assessment phase to the subsequent evaluation, suggests that the management may be effectively addressing the underlying issues related to their condition. After six-month, the percentage of patients with severe disability dropped considerably, indicating that the intervention not only provided immediate relief but also contributed to long-term improvements in functional outcomes. This is particularly noteworthy given that the majority of group B continued to experience higher levels of disability.

The present study revealed that no statistically significant differences in QBPDS between group A and B during the initial assessment. The majority of patients exhibited severe difficulty in performing daily activities during the initial assessment phase prior to the intervention. After three months of intervention, group A showed significant improvements in performing daily activities compared to group B, with statistical significance difference across all points of the QBPDS. By the six-month follow-up, less than three percent of group A experienced severe difficulty with bed rest, ambulation, and movement compared to over five percent in group B. Highly significant statistical difference was found between group A and B across all aspects of the QBPDS after six months. These findings suggest that the intervention had a marked and significant impact on reducing difficulty in performing daily activities over time. This underscores the potential effectiveness of targeted interventions in enhancing functional outcomes for patients with sacroiliac joint dysfunction.

The present study supported by a study conducted in the Sports Medicine Department of Rasoul Akram Hospital in Tehran by **Nejati et al., (2019)** who conducted study on patients with sacroiliac joint dysfunction and divided them into three groups. The first group received posterior innominate self-mobilization, sacroiliac joint stretching, and spinal stabilization exercises. The second group received posterior innominate mobilization and sacroiliac joint dysfunction manipulation. The third group received manipulation maneuvers followed by exercise therapy. All three groups demonstrated significant improvement in pain and disability scores compared to the baseline. Exercise and manipulation therapy appear to be effective in reducing pain and disability in patients with sacroiliac joint dysfunction.

From the researchers' perspective this improvement can be attributed to the targeted nature of the intervention, which likely addressed the underlying biomechanical and functional impairments associated with sacroiliac joint dysfunction. Initially, a majority of patients exhibited severe difficulty in performing daily activities, reflecting the substantial impact of sacroiliac joint dysfunction on functional capacity. Over the course of three and six months, the consistent application of the intervention appears to have resulted in sustained improvements, indicating that practicing the recommended stretching exercises, along with massage using warm coconut oil, may be essential for effective management of sacroiliac joint dysfunction. Furthermore, the findings suggest that early and comprehensive intervention could play a pivotal role in minimizing disability and preventing the progression of functional limitations in patients with this condition.

The present study clarified that there was strong positive correlation between patients' scores regarding numeric pain rating scale, QBPDS and ODI.

A study conducted in four major hospitals in Lahore by **Ghaffar et al., (2023)** supported the present study which clarified that a strong correlation was observed between the numeric pain rating scale and ODI for participants with low back pain.

From the researchers' perspective, the strong positive correlation between patients' scores on the numeric pain rating scale, QBPDS, and ODI suggests that as the intensity of pain increase, the difficulty in performing daily activities and the level of functional

disability experienced by the patients also increase. It is crucial for understanding the interplay between pain and disability in patients with sacroiliac joint dysfunction. The findings imply that effective pain management strategies could improve functional outcomes, as reducing pain may directly enhance patients' ability to perform daily activities.

Finally, the findings of this study have significant implications for nursing practice, especially in the management of patients with sacroiliac joint dysfunction. Nurses are in a unique position to educate patients on effective, non-pharmacological approaches such as stretching exercises combined with natural methods like warm coconut oil massage. By integrating these interventions into nursing care plans, nurses can help alleviate pain, reduce disability, and promote overall functional improvement in patients.

Limitations:

1. Small sample size, which could limit the generalizability of the findings. A larger, more diverse sample would provide more robust evidence.
2. A limited follow-up period (6 months), which does not allow for the assessment of long-term effectiveness of the interventions. Longer follow-up would help determine if the benefits are sustained over time.

Conclusion

The study concluded that combining stretching exercises with natural method; massage with warm coconut oil significantly reduces pain severity and disability in patients with sacroiliac joint dysfunction, compared to stretching exercises alone. This intervention reduce pain and improve functional outcomes for patients with sacroiliac joint dysfunction. The addition of the natural method; massage with warm coconut oil addresses the clinical symptoms of patients and improve overall function. This holistic approach appears to be more effective in managing sacroiliac joint dysfunction and offers a safer alternative to pharmacological treatments and invasive interventions. Consequently, this study provides valuable insights into the benefits of incorporating natural methods alongside traditional exercise regimens in the management of sacroiliac joint dysfunction. The results could lead to more comprehensive, patient-centered care models that combine physical and natural interventions for enhanced therapeutic outcomes.

Recommendations

1. It is recommended to establish educational programs that focus on the use of stretching exercises and natural methods, such as massage with warm coconut oil to assist patients in relieving pain and reducing disability associated with sacroiliac pain syndrome. These programs should aim to educate patients on effective self-management techniques and the benefits of incorporating non-invasive interventions into their treatment plans.
2. Future studies should seek to further validate the findings of this research by investigating the long-term benefits of the combined intervention of stretching exercises and natural methods. This could include longitudinal studies that monitor patients over an extended period to assess the sustainability of pain relief and functional improvements.
3. Additional research should be conducted with larger sample sizes to seek more robust evidence.

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