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### RESEARCH ARTICLE

## EFFECT OF MAT PILATES VERSUS TRADITIONAL MAT EXERCISES IN PATIENT WITH MIGRAINE

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### Abstract

**Background:** Headache, particularly migraine, is a common neurological condition affecting a significant portion of the population worldwide—approximately 4.5-6% of men and 14.5-18% of women. Migraines involve complex pathophysiological mechanisms including brainstem sensitization and structural changes affecting pain processing. Migraine is frequently associated with chronic neck pain, which impacts quality of life. Pilates, a therapeutic exercise method emphasizing core strength, flexibility, and stress reduction, has gained attention for improving physical fitness and mental health. While traditional mat exercises in treating migraines remains under-explored.

**Objectives:** To assess the clinical effectiveness of prescribed exercise programs for migraine patients. To evaluate the impact of prescribed exercise on reducing anxiety and depression, improving posture, and enhancing overall movement to lower migraine risk.

**Procedure:** The initial assessment will be done on the first visit, which includes patient demographic details. Before treatment, baseline evaluation was done by telling the patient to give scoring to the VAS and NDI scoring sheets. Both groups will follow the exercise training programme for 2 weeks, with 3 alternate sessions a week and each session lasting an average of 40 minutes, with an allowance for practicing their usual ADLs.

**Result:** Both Group A and Group B showed statistically significant improvements in pain (VAS) and disability (NDI) scores after intervention ( $p < 0.001$  for all). Group A had a greater reduction in pain (mean difference = 4.094) and disability (mean difference = 18.125) compared to Group B (VAS = 3.267, NDI = 12.567). A strong correlation was found in pain scores (VAS) for Group A ( $r = 0.828$ ), while NDI correlations in both groups were not significant. Overall, Group A's intervention was more effective than Group B's.

**Conclusion:** This study concluded that the intervention used in Group A was more effective in reducing both pain (VAS) and disability (NDI) with 3 alternate sessions for two weeks of intervention in Group B. Given the significant improvements and higher effect size, Group A's treatment approach could be considered superior.

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**Introduction:-**

Headache is defined as a discomfort or painful sensation located at the level of the head above the orbitomeatal line. This condition cause constitutes a public health problem due to its high prevalence and high impact on quality of life. Approximately 4.5–6% of males and 14.5–18% of women suffer from migraines. As a supporting article suggested that the cause of migraines remain unclear due to the increasingly sedentary lifestyle, poor sleep quality or any other untreated undiagnosed that leads to cause nowadays. (4)

According to the International Classification of Headache Disorders, migraine and tension-type headache (TTH) are really the third and sixth most prevalent illnesses worldwide, respectively. Three categories of headache disorders are described by the ICHD-3, which is the classification that medical practitioners use the most: (i) secondary headaches brought on by trauma, injury, vascular and non-vascular infections; (ii) primary headaches, such as migraine, TTH, and trigeminal autonomic headaches; and (iii) painful cranial neuropathy and other facial pain. Primary headaches are conditions that don't seem to have a root cause. (4)(7)

Migraines target the essential regions that involve the structural and functional part along the various muscle groups which are particularly associated with upper extremities. Migraine and cutaneous allodynia are associated, with central sensitization of brainstem trigeminal neurons. Anatomical changes in the brainstem leads to reduced gray matter volume in area of orofacial noxious inputs, dorsal lateral and dorsal medial pons. These areas are essential aspect for controlling pain along with processing the sensory information. It is the area that activates the nociceptors in brainstems arteries and meninges causes the headache leads to migraine by innervated trigeminal afferents. An interpretation of brainstem physiological and structural aspect can guide us the pathophysiological mechanism of migraine which helps us to implement the treatments.(5)

Pilates is a new approach for therapeutic exercises it gained well regarded in the belonging present time due to lack to physical and sedentary stress lifestyle. Joseph Pilates introduces in initial 20<sup>th</sup> century, therapeutic exercise, which is emphasizes core strength, flexibility, reduce stress and balance. This techniques shows essentials beneficial for older adults, by enhancing their physical fitness, reduce stress, improving balance stability and flexibility. Additionally regular Pilates practices contribute mindfulness, reduce anxiety and depression ,improve posture along with enhance overall movement (11).There was a studies which shows the impact of Pilate exercise promote positively to body aspect, relaxed mental and enhance the quality of life. It also acknowledges by improving cardio-respiratory fitness, musculoskeletal health improvement and improving the proprioception, which play a key insight role in injury prevention and recovery. (1)

In this study we have target the migraine patient which were associate with chronic neck pain, prevalence shows that affecting up to 71% of adults along with an annual prevalence ranging between 30% and 50% in the general and working populations. This condition is often associated with structural changes in the cervical extensor muscles, such as increased fat infiltration and variations in cross-sectional area (CSA). (7)

The Neck Disability Index (NDI), developed by Dr. Howard Vernon in 1991, is reliable tool to use self-report for assessing neck pain-related disability. Designed as a standardized and patient-centered measure, the NDI evaluates functional limitations and disability caused by neck pain. It consists of 10 items, each scored on a 0–5 scale, with 0 indicating no disability and 5 indicating maximum disability. The total score ranges from 0 to 50, with higher scores representing greater disability, often expressed as a percentage for ease of interpretation .Interpretation of NDI scores includes five categories: no disability (0–4), mild disability (5–14), moderate disability (15–24), severe disability (25–34), and complete disability (35–50). The NDI remains a reliable and widely validated tool for assessing neck pain and guiding clinical decision-making.(10)

For the study to assess pain intensity we have used VAS scale it is valid and reliable tool for pain measurement. As an interval scale, it allows for precise pain assessment, with a clear range from "no pain" to "worst pain imaginable." Its reliability and validity support its use in clinical practice as a dependable outcome measure for assessing pain intensity. The interpretation of the VAS is the numeric value obtained from where the patient marks the line.(0 cm (no pain) ,1–3 cm (mild pain) ,4–6 cm (moderate pain),7–9 cm (severe pain) and 10 cm (worst pain imaginable).(18) The purpose of this study is to add new clinical implementation based on best practices in treatments of migraine patient with new therapeutically approach in a clinical filed.

**Material and Method:-**

**Sample:** Random sampling

**Sample size:** 62 participants

**Research Design:** Interventional study design

**Inclusion Criteria:**

- Age 20-35 years
- Both males and females
- Diagnosis case from Acute Migraine
- Diagnosis migraine case in and around the Moradabad (Duration 6 month)
- NDI- score (5-14)
- VAS – score more than 5

**Exclusion Criteria:**

- Chronic pain
- Recent Upper extremities and spinal fractures or injury
- Spinal conditions such as prolapsed, herniated or extruded intervertebral disc.
- Stenosis
- Malignancy
- Pott`s spine or other spinal deformities
- NDI- score more than 15
- VAS – score less than 5

**Independent Variables-**

- Age
- Gender

**Dependent Variables-**

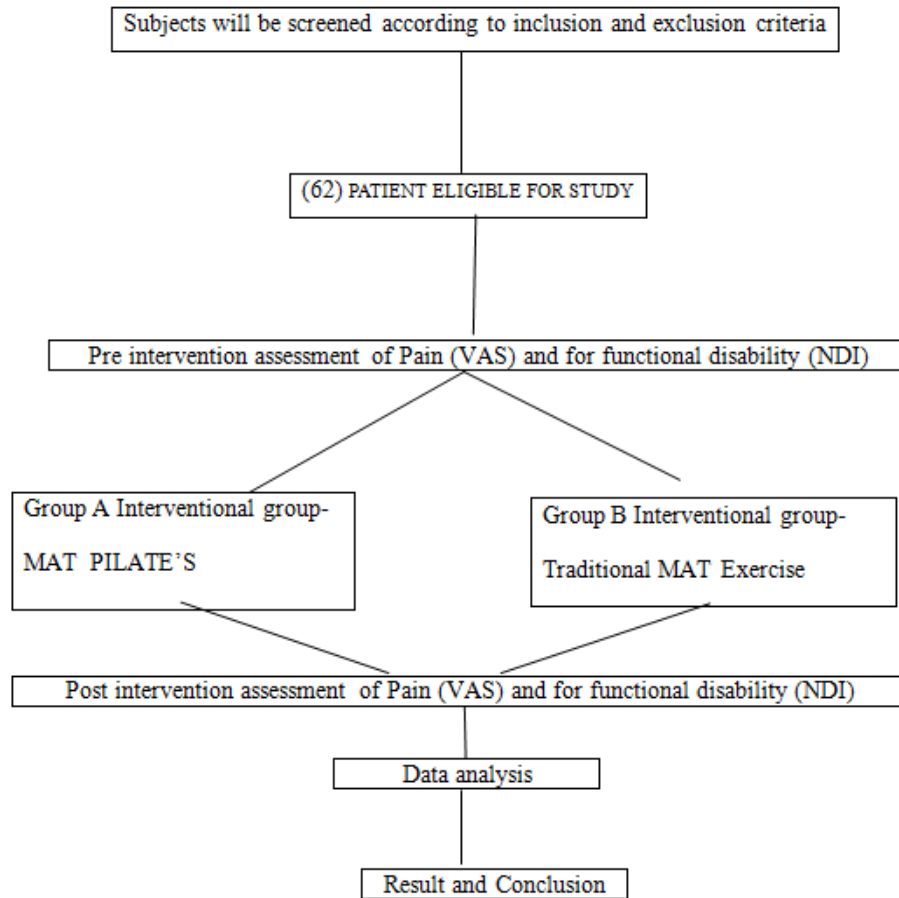
- Visual analogue scale
- Neck Disability Index

**Materials To Be Used:-**

- Consent form
- Assessment form (NDI and VAS)
- Pencil/ pen
- Mat
- Examination table
- Watch

**Location of the study:**

Department of Physiotherapy, Teerthanker Mahaveer University

**Methodology Flow Chart****Procedure:-**

The initial assessment will be done on the first visit, which includes patient demographic details. Before treatment, baseline evaluation was done by telling the patient to give scoring to the VAS and NDI scoring sheets. Both groups will follow the exercise training programme for 2 weeks, with 3 alternate sessions a week and each session lasting an average of 40 minutes, with an allowance for practicing their usual ADLs.

**Patient preparations before treatment**

- A comfortable & quiet environment is required for the therapy to be done.
- Eating heavy meals before & after two hours of treatment should be avoided.
- Patients should be instructed to take off any restrictive clothing & to stop wearing any jewellery that could obstruct their treatment.
- The patient should be as calm as possible before & during the treatment.

**Interventional Protocol-**

**GROUP A:** Interventional group-Mat Pilates exercises in people with migraine treatment protocol.

**Mat Pilates exercises includes:**

- Rolling like a ball- 10 repetitions/10 sec hold/2sets
  - Shoulder bridge level - 1 - 10 repetitions/10 sec hold/2sets
  - Breast stroke level - 1 - 10 repetitions/10 sec hold/2sets
  - Child's pose side stretch - 10 repetitions/10 sec hold/2sets
- (2 SETS of 10 REPETITIONS in 3 ALTERNATE SESSIONS /WEEK)

**GROUP B:** Interventional group-Traditional mat exercises in people with migraine treatment protocol

**Traditional Mat exercise includes:**

- Parsva Balasana (bird dog pose) - 10 repetitions/10 sec hold/2sets
  - Progressive Relaxation and Breathing -10 repetitions/10 sec hold/2sets
  - Glute Bridge -10 repetitions/10 sec hold/2sets
  - Neck and Shoulder rolls -10 repetitions/10 sec hold/2sets
- (2 SETS of 10 REPETITIONS in 3 ALTERNATE SESSIONS /WEEK)

At the end of the second week, a follow-up evaluation was completed and recorded for both groups. The data was analysed for the final results after taking into account all outcome measurements.



**Figure 1:-** Mat Pilates exercise (a) rolling like a ball (b) shoulder bridge level 1(c) breast stroke level 1 (d) child pose side stretch.



**Figure 2:-** Traditional mat exercise (a) Parsva Balasana alsoknown as bird dog pose(b) Progressive Relaxation and Breathing (c) Glute Bridge (d) Neck and Shoulder rolls.

**Result:-**

Our study revealed that both the group A and B showed statistically significant improvement in VAS and NDI score after intervention, which can be additionally clinically implementation in treating the migraine patients.

**Descriptive Statistics****Table 1:-** Descriptive statistics depicts that the mean and SD.

	N	Minimum	Maximum	Mean	Std. Deviation
AGE_A	32	22	32	25.03	2.087
A_PRE_VAS	32	7	9	8.03	.897
A_POST_VAS	32	2	7	3.94	1.435
A_PRE_NDI	32	35	45	39.41	2.917
A_POST_NDI	32	13	32	21.28	4.658
AGE_B	30	20	28	24.13	2.813
B_PRE_VAS	30	7	9	8.10	.885
B_POST_VAS	30	3	7	4.83	1.085
B_PRE_NDI	30	35	45	39.40	3.136
B_POST_NDI	30	19	37	26.83	3.824
Valid N (listwise)	30				

**Table 2:-** Shows paired sample t-test of pre and post of VAS and NDI score in both the group A and group B.**Paired Samples Test**

		Paired Differences				
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference	
					Lower	Upper
Pair 1	A_PRE_VAS A_POST_VAS	4.094	.856	.151	3.785	4.402
Pair 2	A_PRE_NDI A_POST_NDI	18.125	5.488	.970	16.147	20.103
Pair 3	B_PRE_VAS B_POST_VAS	3.267	.907	.166	2.928	3.605
Pair 4	B_PRE_NDI B_POST_NDI	12.567	4.281	.782	10.968	14.165

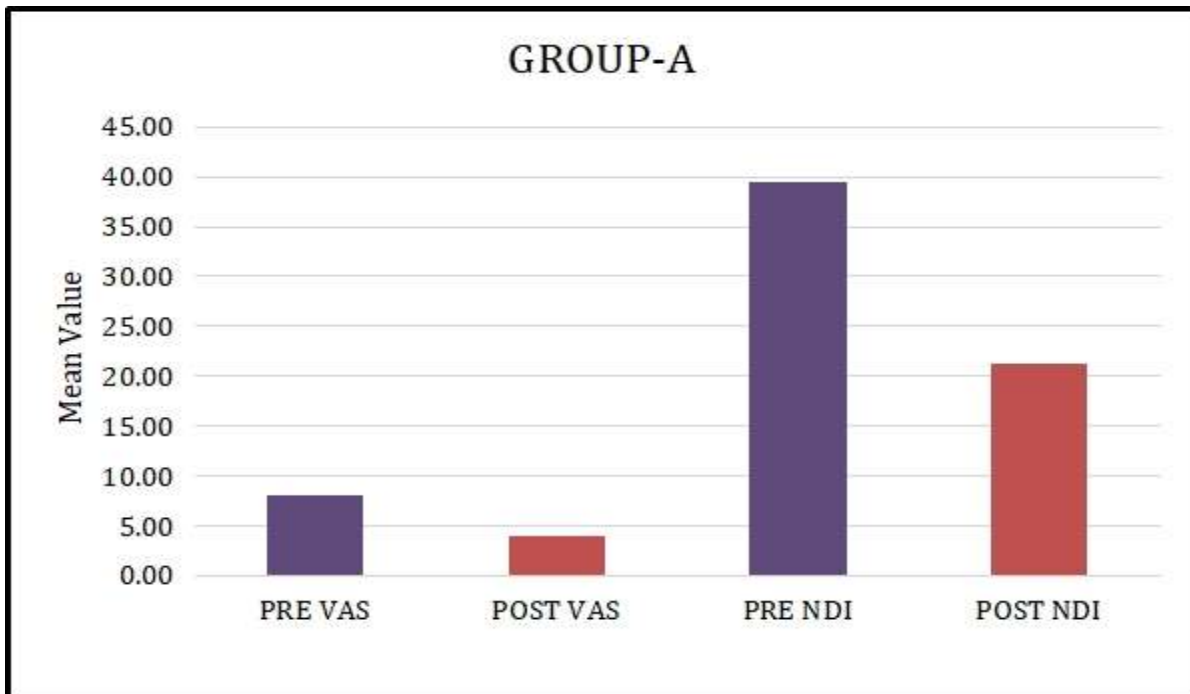
**Table 3:-** Correlation between pre and post, both groups showed statically significant correlations for VAS score. For NDI scores, the correlation was non-significant in both the groups.**Paired Samples Correlations**

		N	Correlation	Sig.
Pair 1	A_PRE_VAS & A_POST_VAS	32	.828	.000
Pair 2	A_PRE_NDI & A_POST_NDI	32	.003	.986
Pair 3	B_PRE_VAS & B_POST_VAS	30	.592	.001
Pair 4	B_PRE_NDI & B_POST_NDI	30	.256	.172

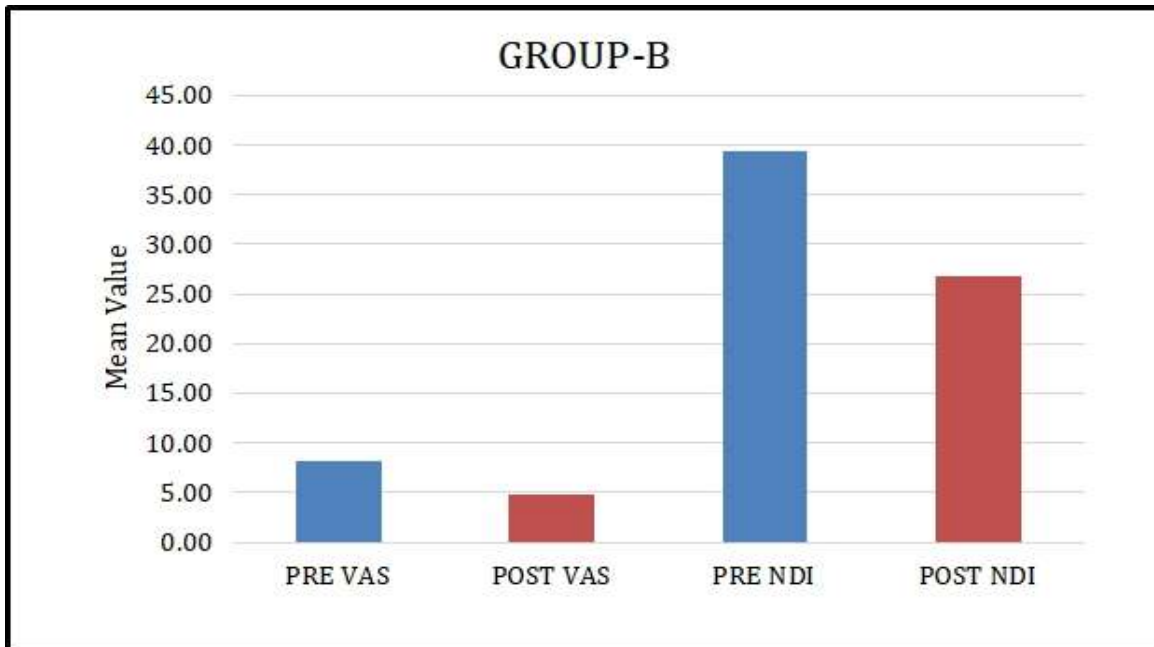
**Table 4:-** Shows pre and post intervention mean score, along with SD for both group A and B, It shows significant improvements post intervention in both the groups.

**Paired Samples Statistics**

		Mean	N	Std. Deviation	Std. Error
Pair 1	A PRE VAS	8.03	32	.897	.159
	A POST VAS	3.94	32	1.435	.254
Pair 2	A PRE NDI	39.41	32	2.917	.516
	A POST NDI	21.28	32	4.658	.823
Pair 3	B PRE VAS	8.10	30	.885	.162
	B POST VAS	4.83	30	1.085	.198
Pair 4	B PRE NDI	39.40	30	3.136	.573
	B POST NDI	26.83	30	3.824	.698



**Graph 1:-** Illustrates the mean pre and post intervention values of VAS (pre 8.03 and post 3.94) and NDI (pre-39.41 and post 21.28) in group –A.



**Graph 2;-** Illustrate the mean pre and post intervention values of VAS (pre 8.10 and post 4.83) and NDI (pre-39.40 and post 26.83) in group –B.

GROUP- A	PRE VAS	8.03	GROUP- B	PRE VAS	8.10
	POST VAS	3.94		POST VAS	4.83
	PRE NDI	39.41		PRE NDI	39.40
	POST NDI	21.28		POST NDI	26.83

**Discussion and Conclusion:-**

The present study aimed to evaluate and compare the effects of mat Pilates and traditional mat exercises on pain and disability in patients with migraine. The outcomes, assessed through the Visual Analog Scale (VAS) and the Neck Disability Index (NDI), revealed statistically significant improvements in both groups. However, the intervention in Group A (mat Pilates) demonstrated a greater reduction in pain and disability compared to Group B (traditional exercises). These findings align with the results of Gonca SahinerPicak et al. (2022), where clinical Pilates showed superior improvement in pain, disability, and deep neck flexor endurance among patients with chronic nonspecific neck pain. Likewise, Mahmoud et al. (2022) highlighted the role of Pilates in enhancing deep cervical flexor muscle activation, which is instrumental in neck stability and potentially beneficial for migraine-related symptoms.

The psychological and emotional benefits of Pilates noted in studies by Ana Cruz-Ferreira et al. (2011) and Hulya Yucel et al. (2016) also support our findings, where participants engaging in mat Pilates experienced a higher magnitude of improvement in functional outcomes. These effects may be attributed to the mind-body integration aspect of Pilates that addresses both physical and emotional contributors to chronic pain. Further, the psychosocial benefits reported in Laura Denham-Jones et al. (2021) offer insight into the potential for increased adherence and motivation in group-based Pilate’s interventions, especially for older populations and chronic condition sufferers. This might explain the better engagement and outcomes in Group A.

While both mat Pilates and traditional mat exercises were effective, the superior improvement in Group A suggests that Pilates offers additional benefits, possibly due to its emphasis on core stability, neuromuscular control, and posture alignment. This is consistent with the conclusions of SahinerPicak et al. (2022) and Cruz-Ferreira et al. (2011), where Pilates showed advantages in both physical and psychological dimensions. In our current study, a strong correlation was found in group-A in VAS, while in NDI correlations in both the group were not significant. This indicates a varied response among participants concerning functional disability, possibly influenced by individual differences in baseline disability, coping mechanisms, and adherence to the exercise protocol.

In conclusion, the present study supports the growing body of literature suggesting that mat Pilates is an effective intervention for managing pain and disability in migraine patients. Compared to traditional exercises, it appears to offer enhanced benefits, especially in terms of pain reduction and potentially long-term musculoskeletal and psychosocial improvements.

This study concluded that the intervention used in Group A was more effective in reducing both pain (VAS) and disability (NDI) with 3 alternate sessions for two weeks of intervention in Group B. Given the significant improvements and higher effect size, Group A's treatment approach could be considered superior.

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