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AN OBSERVATIONAL STUDY TO EVALUATE THE EFFECTS OF TUNING FORK (SOUND WAVE/ SOUND HEALING) ON PAIN AND MUSCLE TONE IN WOMEN WITH CHRONIC PELVIC FLOOR DYSFUNCTION

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KEYWORDS
Pelvic floor dysfunction (PFD), Sound healing, VAS (Visual Analog Scale), Pelvic Floor Impact Questionnare (PFIQ-7)

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Abstract

Background: The development of Pelvic floor dysfunction (PFD) is multifactorial, with several mechanical, physiological, and lifestyle-related factors contributing to its occurrence. Among physically active women, pelvic floor dysfunction is commonly associated with participation in high-impact sports. Activities that involve repeated jumping, running, and rapid changes in movement can place excessive stress on the pelvic floor muscles by repeatedly increasing intra-abdominal pressure. Over time, these repetitive loads may impair the normal function and support provided by the pelvic floor, increasing the likelihood of dysfunction. Therefore, effective management requires careful identification and treatment of the factors contributing to the disorder. In this study an integrated treatment approach by incorporating sound healing using tuning forks alongside Pelvic floor exercises has been introduce to reduce symptoms and improve function.

Objective: The objective of the study is to i) Assess the efficacy of sound wave(sound healing) in rehabilitation to improve pain and muscle tone in pelvic floor dysfunction, ii) Assess the efficacy of traditional pelvic floor exercises to improve pain and muscle tone in pelvic floor dysfunction, iii) assess the qualitative measures on women's pelvic floor muscles.

Methods: 30 Athletes Diagnosed with Pelvic floor dysfunction (PFD) by the Physiotherapy department, Orthopedic department OPD, sports rehab department were initially assessed for the inclusion or exclusion criteria. Prior to the treatment procedure patient are oriented to the study.
Outcome measure: VAS (Visual Analog Scale), Pelvic Floor Impact Questionnare (PFIQ-7) is used for measuring pre and post intervention evaluation.

Results: The 6-week intervention protocol produced clinically and statistically significant improvements in both VAS pain scores and Pelvic Floor Impact Questionnare (PFIQ-7) measures in Group A, with the greatest benefits in pain-related and functional domains. Group B demonstrated smaller, less consistent improvements.

Conclusion: The findings suggest that the exercise program played a significant role in reducing symptoms and improving function, while the addition of tuning fork (sound wave therapy/sound healing) appeared to provide further clinical benefits. These additional effects may have enhanced the overall treatment outcomes observed in the intervention group.

INTRODUCTION

Pelvic floor dysfunction (PFD) is a broad clinical condition that includes a range of disorders affecting the normal function of the pelvic floor muscles. It encompasses conditions such as urinary incontinence, anal incontinence, dyspareunia, vaginal laxity, and pelvic organ prolapse, which are collectively classified under the term pelvic floor dysfunction(1). The development of PFD is multifactorial, with several mechanical, physiological, and lifestyle-related factors contributing to its occurrence.Among physically active women, pelvic floor dysfunction is commonly associated with participation in high-impact sports. Activities that involve repeated jumping, running, and rapid changes in movement can place excessive stress on the pelvic floor muscles by repeatedly increasing intra-abdominal pressure(2). Over time, these repetitive loads may impair the normal function and support provided by the pelvic floor, increasing the likelihood of dysfunction. In female athletes, the occurrence of urine leakage is closely related to the frequency and intensity of participation in activities that generate elevated intra-abdominal pressure. Repeated exposure to these mechanical stresses may exceed the supportive capacity of the pelvic floor muscles, thereby increasing the risk of urinary symptoms during sports and other physical activities(3,4).

According to the EPINCONT study, nearly one-quarter of women reported experiencing involuntary urine leakage, while approximately 7% had symptoms severe enough to require clinical treatment. Stress urinary incontinence is the most frequently reported form of urinary incontinence in women and typically occurs when activities that increase intra-abdominal pressure, such as coughing, sneezing, jumping, or walking, result in urine leakage(5,8). Another common condition is overactive bladder (OAB) syndrome, previously referred to as urge incontinence, which is characterized by urinary urgency, increased urinary frequency, nocturia, and may or may not be accompanied by involuntary urine loss. Psychological conditions such as depression, anxiety, and hypochondriasis have been reported more frequently in women with bladder dysfunction than in the general female population. In cases of non-pathological pelvic floor dysfunction, the absence of a clearly identifiable anatomical cause makes it difficult to provide condition-specific treatment, often resulting in challenges in long-term management.

Persistent symptoms and chronic pain may further contribute to psychological distress, increasing the likelihood of anxiety and depressive symptoms. In addition, psychosocial factors, including fear-avoidance behaviour, coping mechanisms, and the level of social support, can significantly influence both the individual's perception of pelvic floor dysfunction and the overall response to treatment(5,6,7,8).

Conservative management(9) of pelvic floor dysfunction primarily includes pelvic floor muscle training, manual therapy, and techniques aimed at either facilitating muscle activation or promoting relaxation. Previous studies have reported that interventions such as pelvic floor muscle exercises, manual therapy, myofascial release, and muscle energy techniques, when combined with a home-based programme of stretching and strengthening exercises, are effective in reducing the symptoms associated with pelvic floor dysfunction(9,10,11,12). Conventional physiotherapy remains the primary approach for the management of pelvic floor dysfunction and commonly includes pelvic floor muscle training, lifestyle modification, biofeedback, and other rehabilitation techniques. While these interventions have shown beneficial outcomes, there is growing interest in exploring complementary therapies that may further enhance treatment outcomes, particularly over the long term. In the present study, sound healing(13,14) has been introduced as an adjunct to conventional physiotherapy to investigate its potential role in improving clinical outcomes. Sound healing is considered a non-invasive therapeutic approach that utilizes sound vibrations to promote relaxation and support the body's natural healing processes. It is believed that these vibrations may help reduce muscle tension, encourage relaxation, and contribute to overall physical and psychological well-being(15).

Among the various instruments used in sound healing, tuning forks(16) are recognized for their ability to produce precise and consistent vibrational frequencies. These vibrations are thought to facilitate relaxation, reduce stress, improve mental calmness, and promote balance within the neuromuscular system. tuning fork is a simple U-shaped metal instrument that produces a pure, single-frequency sound when gently struck against a suitable surface. Owing to its ability to generate consistent vibrational frequencies, it has become one of the commonly used instruments in sound healing practices(17).

It is believed that these vibrations help induce a deep state of relaxation, which may reduce muscle tension and promote a sense of physical and mental well-being. Because of these proposed therapeutic effects, tuning forks have gained increasing attention as a complementary tool in rehabilitation and integrative healthcare.

Tuning fork therapy is considered a non-invasive therapeutic approach that works on principles similar to acupuncture; however, instead of needles, it utilizes specific sound frequencies to stimulate corresponding treatment points. Therapeutic tuning forks, particularly those vibrating at **128 Hz**, have been used for the management of conditions such as muscle contractures, musculoskeletal pain, and bone-related pain, along with several other clinical applications (13,14,16).Although these effects have been described in complementary therapy literature, the application of tuning fork based sound healing in physiotherapy remains limited. Therefore, the present study aims to explore whether incorporating tuning fork therapy with conventional physiotherapy can provide additional benefits in the management of pelvic floor dysfunction.

MATERIAL&METHOD

Study Design: Observational Study

Sample Design: Simple random sampling

Sample Size: 30 Female Athletes affected with Female individuals with pelvic floor dysfunction were randomized selected and assessed for the pre-test parameter.

Study Setting: Patient were treated 6 times per week for 6 week at Department of physiotherapy, Pacific Medical college and hospital. UDAIPUR

Study Population: Male & Female both the athletes with pelvic floor dysfunction of age group of 20-40 years of age related injury or trauma and are willing to participate in this study.

Study Duration: one year

Sample Size: 30 participants

Treatment Duration: Single session 45-60 minutes for (6 days per week) for 6 weeks.

SELECTION CRITERIA:

Inclusion Criteria:

- Age group of 20 – 40 years (female

individuals)

- Patient with non-pathological pelvic floor dysfunction
  (Symptoms of voiding dysfunction i)urinary incontinence, ii) urinary urgency or frequency, iii)obstructive voiding symptoms)
- Patients with normal vitals
- Patients with no other complications
- Voluntary participation (e.g. ability to give written informed consent)

Exclusion Criteria:

- Patient having chronic disease
- Age group- below 20 and above 40 age group not included
- Patient with secondary complications
- Unconcious and unoriented patient
- Participants who are unwilling and unable to follow instructions and go through the testing procedures.

PROCEDURE

Permission for conduct Study is taken from the institutional ethical committee of PMCH (**Protocol no. PMU/IEC/MPT/2025**), Pacific medical university bhilo ka bedla Udaipur(RAJ).

Athletes Diagnosed with pelvic floor dysfunction by the Physiotherapy department, Orthopedic department OPD; initially assessed for the inclusion or exclusion criteria. Prior to the treatment procedure, all participants were informed about the purpose, procedures, potential benefits, and possible risks of the study. Written informed consent was obtained from each participant prior to enrollment. Patients are divided in to two groups and both groups were assessed for the pre-test parameter.

- 30 subjects were selected on the basis of inclusion criteria and randomly divided into Group A and Group B.
- Group A (n=15) treated with Exercise + twice in a week tunic fork therapy. (Intervention Group)
- Group B (n=15) treated with Exercise.(Control Group)

Group A (n=15) treated with Exercise + twice in a week tunic fork therapy. (Intervention Group)

Sound wave frequency (tuning fork)

Using sound wave frequency (tuning fork).sound waves creates scaler waves. Surroundings forms begins resonating with the scaler waves. Kling the tuning forks, and they will be held at a 90-degree angle near the ear or temporal area for 10 rungs or 10

times, 30 seconds to each ear or temporal area until the sound lasts. This will be done twice a week for 6 weeks.

Exercises for pelvic floor

- Diaphragmatic breathing exercises
- Gentle pelvic tilt
- Cat and camel exercises
- Wall squat pose
- Butterfly stretch
- Piriformis stretch.

Group B (n=15) treated with Exercise.(Control Group)

Exercises for pelvic floor

- Diaphragmatic breathing exercises
- Gentle pelvic tilt
- Cat and camel exercises
- Wall squat pose
- Butterfly stretch
- Piriformis stretch.

DATA ANALYSIS AND RESULTS

The findings suggest that the exercise program played a significant role in reducing symptoms and improving function, while the addition of tuning fork (sound wave therapy/sound healing) appeared to provide further clinical benefits. These additional effects may have enhanced the overall treatment outcomes observed in the intervention group. Based on the overall trend of improvement from baseline, the findings may be considered clinically satisfactory. These results suggest that both treatment approaches were effective in producing beneficial changes, although neither intervention demonstrated a markedly superior effect over the other.

The results are presented as Patient participated in group A shows more significant changes. Group A result were found better than group B, results as data analysis showed VAS (Visual Analog Scale) of group A mean±SD is 7.26±1.03 improve to 2.33±1.29 post intervention. Group B VAS (Visual Analog Scale) data of pretest mean±SD is 6.93±0.88 improve to 4.13±0.91 post intervention. Data analysis of PFIQ-7(Pelvic floor impact questionnaire) also significant for group A Compared to group B: for group A pretest value of all component of PFIQ-7(Pelvic floor impact questionnaire mean±SD is 94.73±25.35 improve to 33.93±15.15 in post test. The group B value of all component of PFIQ-

7(Pelvic floor impact questionnaire before intervention mean±SD is 95.06±13.16 improve to 60.66±15.20 in post test. After comparing all the data both PFIQ-7(Pelvic floor impact questionnaire and VAS (Visual Analog Scale) demonstrated improvement in both group.

Socio-Demographic Profile – Region (Rural/Urban)

Table 1.1

Exhibiting the Region-wise Distribution of the Selected Sample of Group A and Group B

	Group A		Group B		Total	
Region	**N**	**%**	**N**	**%**	**N**	**%**
Rural	6	40.00%	6	40.00%	12	40.00%
Urban	9	60.00%	9	60.00%	18	60.00%
Total	**15**	**100.00%**	**15**	**100.00%**	**30**	**100.00%**

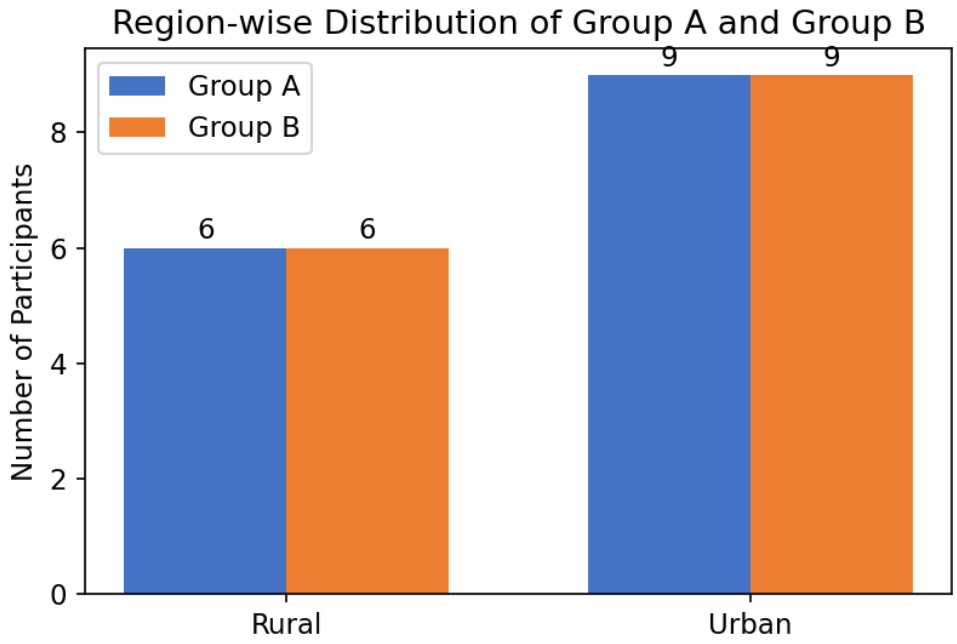


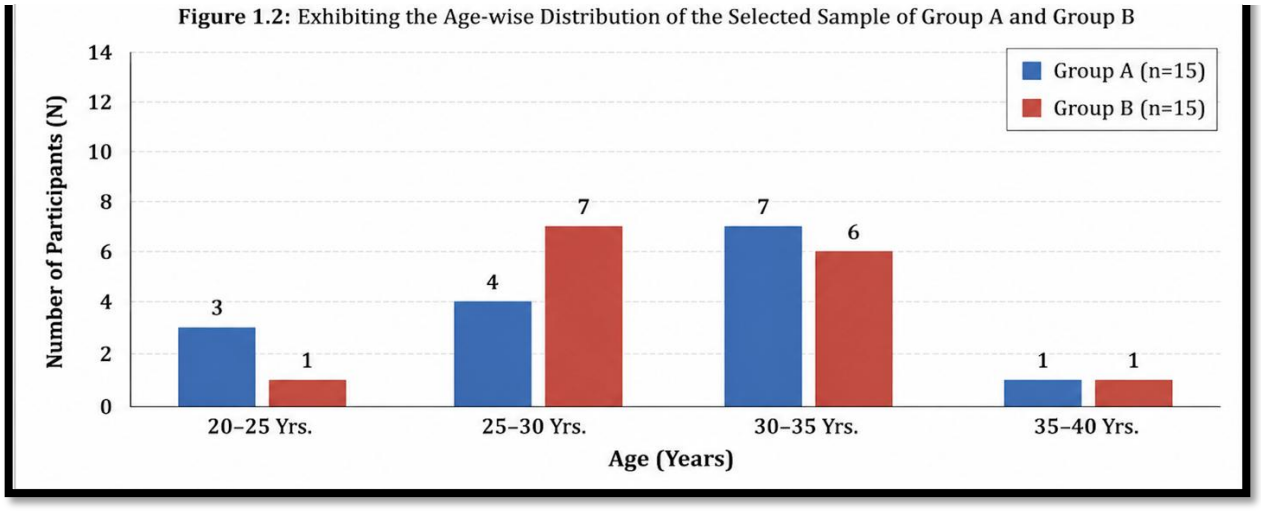
Figure 1.1 Exhibiting the Region-wise Distribution of the Selected Sample of Group A and Group B

Socio-Demographic Profile - Age

Table 1.2: Exhibiting the Age-wise Distribution of the Selected Sample of Group A&Group B

Age Group (Years)	Group A		Group B		Total	
	N	%	N	%	N	%
20–25	3	20.00	1	6.67	4	13.33
25–30	4	26.67	7	46.67	11	36.67
30–35	7	46.67	6	40.00	13	43.33
35–40	1	6.67	1	6.67	2	6.67
Total	15	100.00	15	100.00	30	100.00

Figure 1.2: Exhibiting the Age-wise Distribution of the Selected Sample of Group A and Group B



Baseline Comparability of Group A and Group B

Table 1.3: Exhibiting Baseline Anthropometric and Clinical Characteristics of Group A and Group B (Independent Samples t-test)

Characteristic	Group A Mean±SD	Group B Mean±SD	t	p
Age (yrs)	29.07 ± 4.57	29.20 ± 3.12	-0.093	0.9264
Weight (kg)	60.60 ± 6.39	61.87 ± 4.61	-0.623	0.5386
Height (cm)	159.80 ± 5.16	159.47 ± 4.75	0.184	0.8552
BMI (kg/m²)	23.86 ± 3.24	24.37 ± 2.11	-0.508	0.6153
Symptom Duration (m)	8.13 ± 4.32	9.07 ± 4.10	-0.607	0.5488
Parity	1.67 ± 0.82	1.93 ± 0.80	-0.904	0.3736

Table 1.3 shows that Group A and Group B were statistically comparable at baseline on all anthropometric and clinical variables ($p>0.05$ in every case), confirming that the two groups were well matched before the intervention and that any subsequent differences in outcome can reasonably be attributed to the treatment received rather than to baseline imbalance.

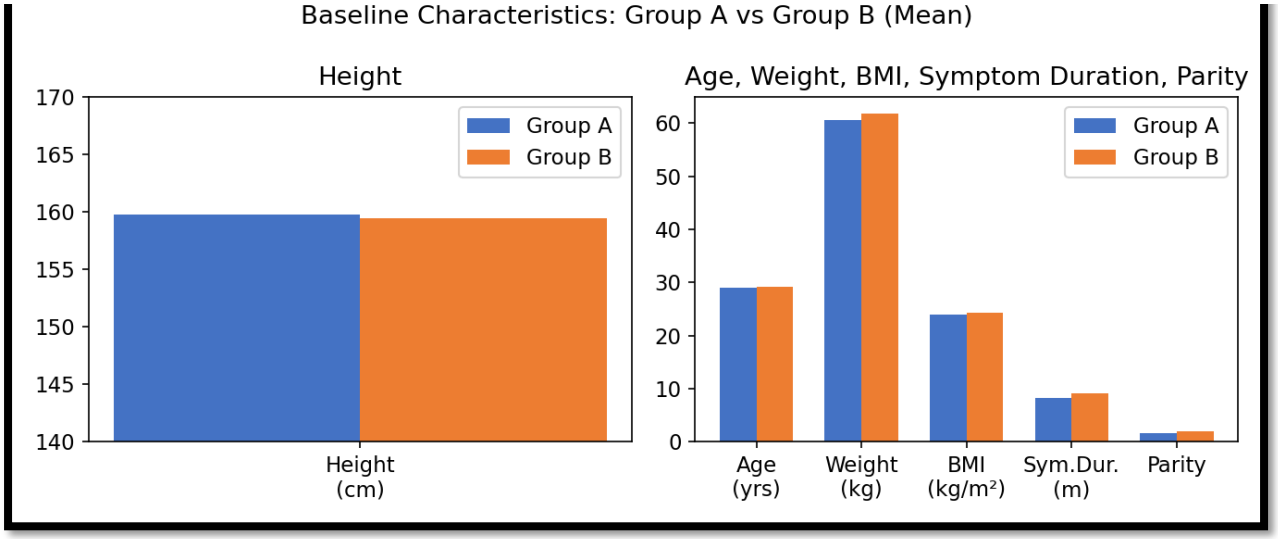


Figure 1.3 Exhibiting Baseline Anthropometric and Clinical Characteristics of Group A and Group B

VAS Score Pre-Post for Group A

Table 1.4: Exhibiting Descriptive Statistics for VAS Score Pre-Post for Group A

Time Point	N	Minimum	Maximum	Mean	Std. Deviation	F	Sig.
VAS Pre	15	6	9	7.2667	1.0328	133.561	0.001
VAS Post	15	0	4	2.3333	1.2910		
Overall	30	0	9	4.8000	2.7593		

Table 1.4 shows a marked decline in the mean VAS score for Group A, from 7.27 pre-treatment to 2.33 post-treatment, indicating a substantial reduction in pain. The difference across time points was highly significant ($F = 133.56$, $p<0.001$), and a paired t-test on the same data likewise confirmed the improvement ($t = 32.19$, $p<0.001$).

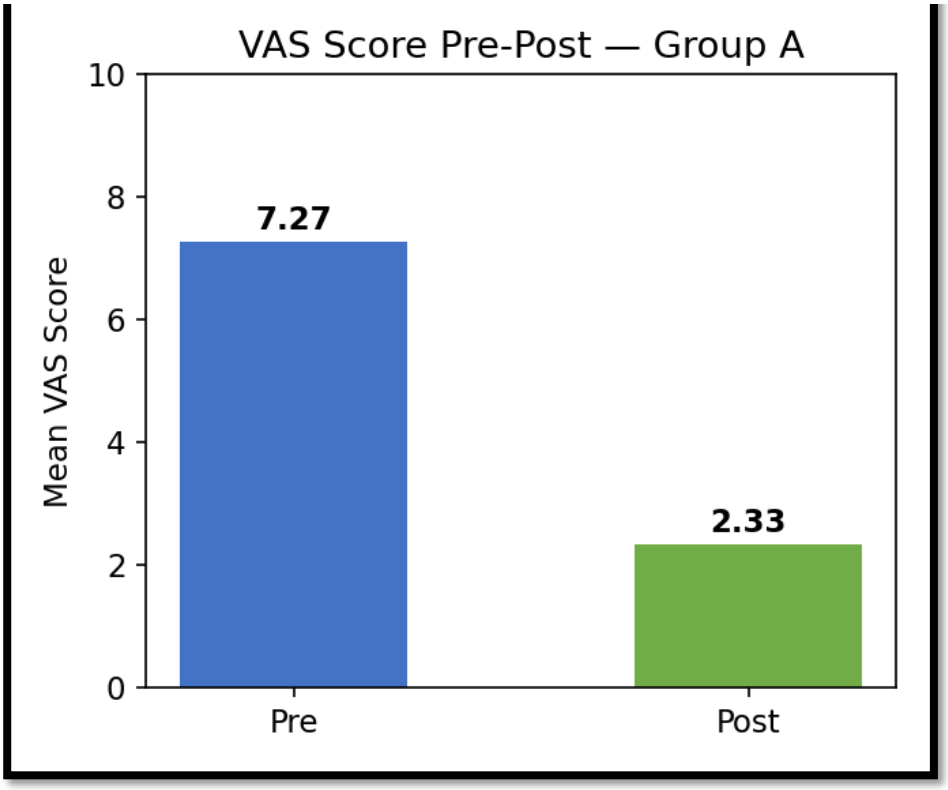


Figure 1.4 Exhibiting VAS Score Pre-Post for Group A

PFIQ-7 Score Pre-Post for Group A

Table 1.5: Exhibiting Descriptive Statistics for PFIQ-7 Score Pre-Post for Group A

Time Point	N	Minimum	Maximum	Mean	Std. Deviation	F	Sig.
PFIQ-7 Pre	15	61	140	94.7333	25.3588	63.527	0.001
PFIQ-7 Post	15	15	55	33.9333	15.1585		
Overall	30	15	140	64.3333	37.1134		

The mean PFIQ-7 score for Group A dropped from 94.73 pre-treatment to 33.93 post-treatment, reflecting a substantial improvement in pelvic-floor-related quality of life. The change over time was highly significant ($F = 63.53$, $p<0.001$; paired $t = 15.43$, $p<0.001$).

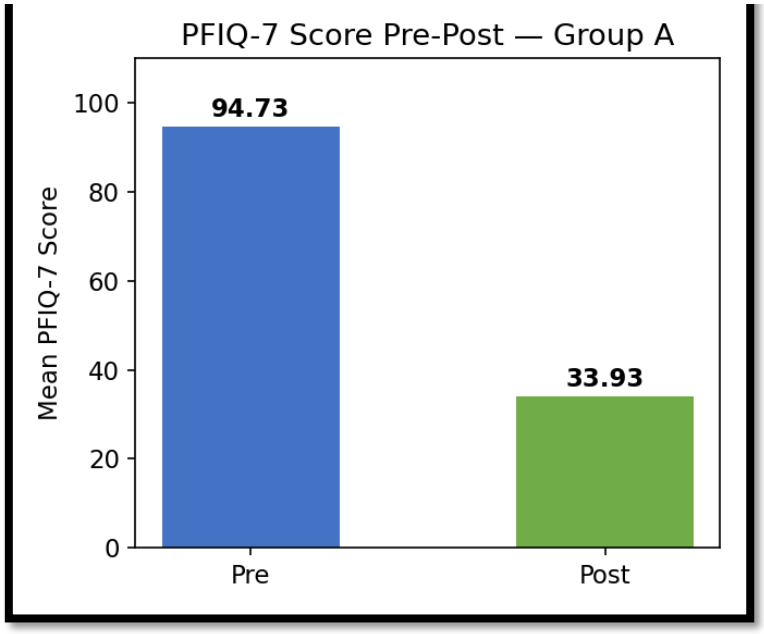


Figure 1.5 Exhibiting PFIQ-7 Score Pre-Post for Group A

VAS Score Pre-Post for Group B

Table 1.6: Exhibiting Descriptive Statistics for VAS Score Pre-Post for Group B

Time Point	N	Minimum	Maximum	Mean	Std. Deviation	F	Sig.
VAS Pre	15	5	8	6.9333	0.8837		
VAS Post	15	3	6	4.1333	0.9155	72.635	0.001
Overall	30	3	8	5.5333	1.6761		

Group B also showed a significant reduction in VAS score, from a pre-treatment mean of 6.93 to a post-treatment mean of 4.13 ($F = 72.64$, $p<0.001$; paired $t = 10.69$, $p<0.001$), though the magnitude of reduction was smaller than in Group A.

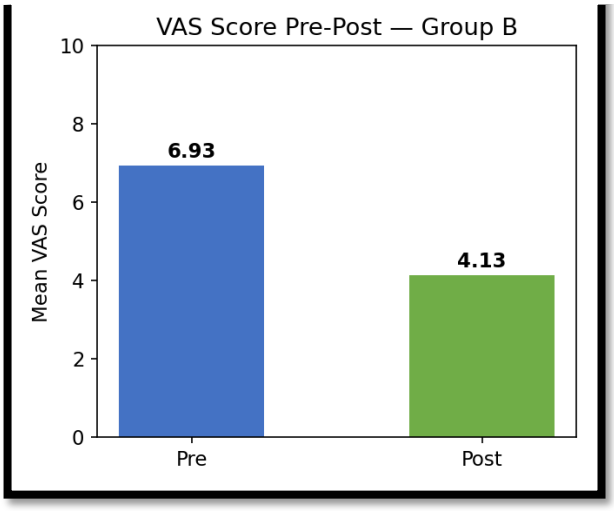


Figure 1.6 Exhibiting VAS Score Pre-Post for Group B

PFIQ-7 Score Pre-Post for Group B

Table 1.7: Exhibiting Descriptive Statistics for PFIQ-7 Score Pre-Post for Group B

Time Point	N	Minimum	Maximum	Mean	Std. Deviation	F	Sig.
PFIQ-7 Pre	15	69	109	95.0667	13.1663		
PFIQ-7 Post	15	35	84	60.6667	15.2065	43.873	0.001
Overall	30	35	109	77.8667	22.3911		

For Group B, the mean PFIQ-7 score decreased from 95.07 pre-treatment to 60.67 post-treatment ($F = 43.87$, $p<0.001$; paired $t = 13.41$, $p<0.001$), a significant but comparatively smaller improvement than that observed in Group A.

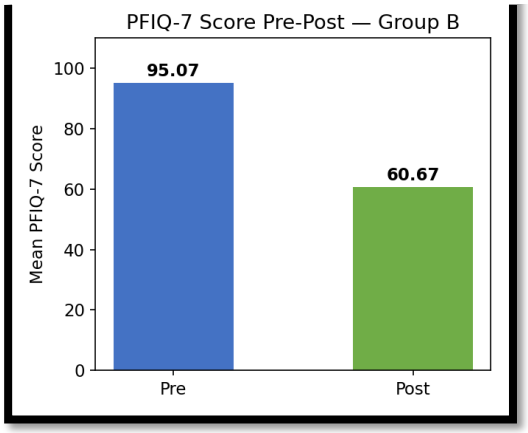


Figure 1.7 Exhibiting PFIQ-7 Score Pre-Post for Group B

Comparative Study of Group A and Group B

For this objective, VAS and PFIQ-7 scores recorded pre- and post-treatment for the 15 respondents in each group were pooled (N = 30 per group) to obtain group statistics, and an independent samples t-test was applied. The results were as follows:

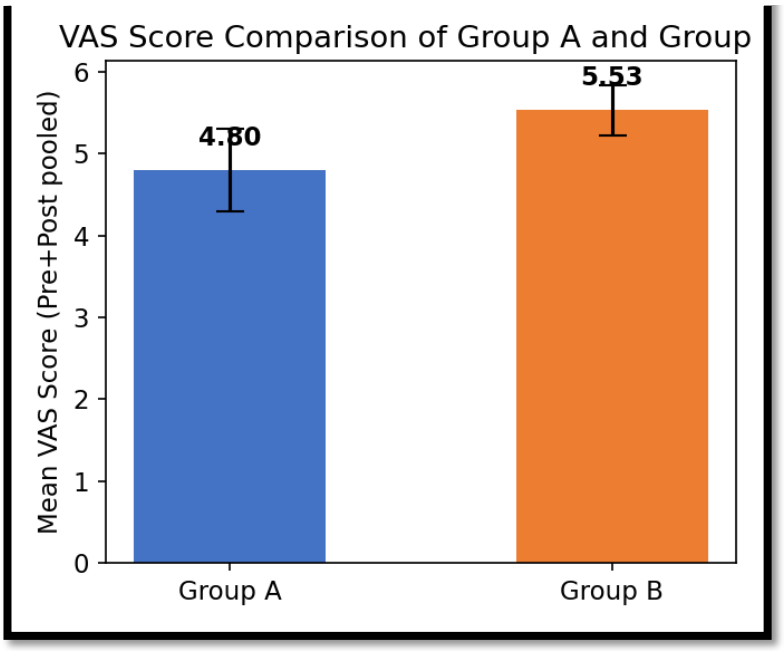


Figure 1.8 Exhibiting VAS Score Comparison of Group A and Group B

Table 1.8.1 Group Statistics – VAS Score

Group	N	Mean	Std. Deviation	Std. Error Mean
Group A	30	4.80	2.76	0.504
Group B	30	5.53	1.68	0.306

Table 1.8.2 Independent Samples Test – VAS Score

	t-test for Equality of Means			
	t	df	Sig. (2-tailed)	Mean Difference
VAS Score	-1.244	58	.218	-0.733

When Pre and Post scores are pooled, the overall mean VAS score of Group A (4.80) is somewhat lower than that of Group B (5.53); however, the difference did not reach statistical significance (t = -1.24, df = 58, p = 0.218). This pooled comparison mixes pre- and post-treatment values together and should be interpreted alongside the Pre-Post and Δ-score analyses above and below, which are more informative about relative treatment effect.

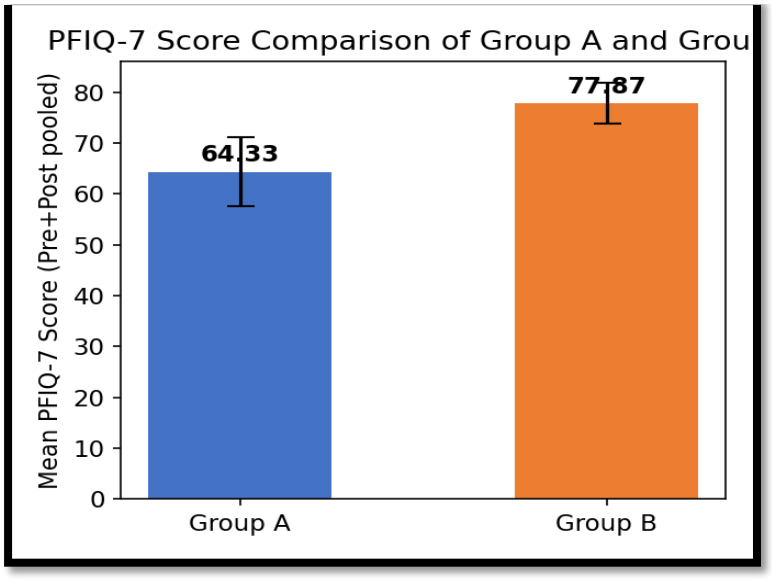


Figure 1.9 Exhibiting PFIQ-7 Score Comparison of Group A and Group B

Table 1.9.1 Group Statistics – PFIQ-7 Score

Group	N	Mean	Std. Deviation	Std. Error Mean
Group A	30	64.33	37.11	6.776
Group B	30	77.87	22.39	4.088

Table 1.9.2 Independent Samples Test – PFIQ-7 Score

	t-test for Equality of Means			
	t	df	Sig. (2-tailed)	Mean Difference
PFIQ-7 Score	-1.710	58	.093	-13.533

The pooled mean PFIQ-7 score was lower in Group A (64.33) than in Group B (77.87), but the difference again fell short of conventional significance (t = -1.71, df = 58, p = 0.093).

Comparison of the Magnitude of Improvement Between Group A and Group B

Table 1.10:Exhibiting an Independent Samples t-test on Pre−Post Change Scores of Group A vs Group B

Parameter	Group A Δ Mean±SD	Group B Δ Mean±SD	t	p	Sig.
VAS Δ (Pre−Post)	4.93 ± 0.59	2.80 ± 1.01	7.031	0.000001	p<0.001
PFIQ-7 Δ (Pre−Post)	60.80 ± 15.27	34.40± 9.93	5.614	0.000004	p<0.001

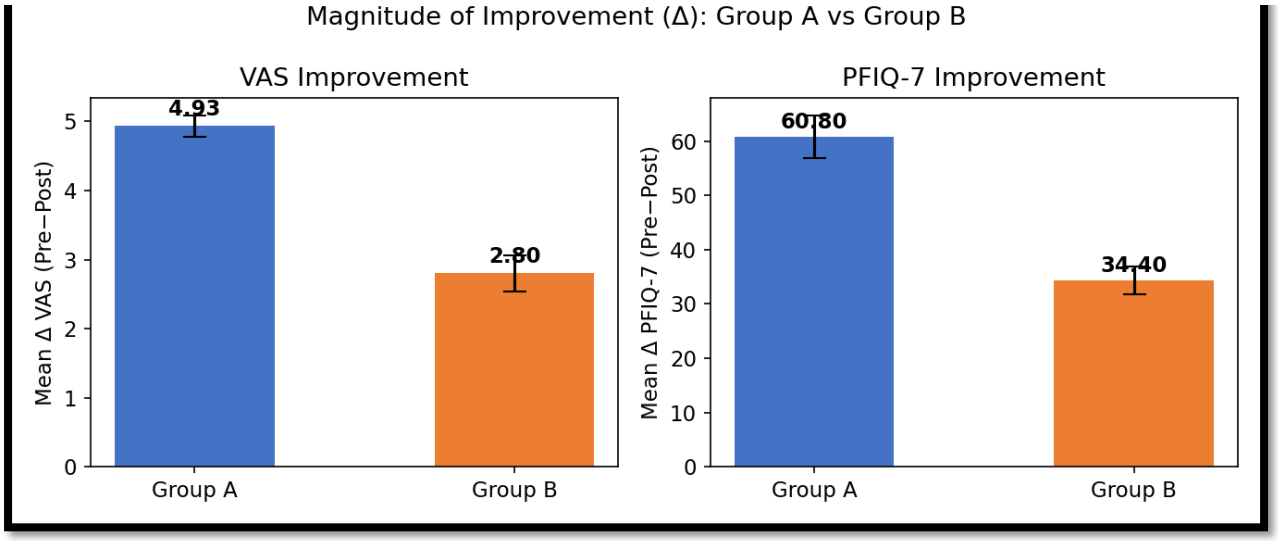


Figure 1.10 Exhibiting Magnitude of Improvement (Δ) Between Group A and Group B

Unlike the pooled comparison, the change-score (Δ) analysis directly tests which group improved more from Pre to Post. Group A showed a significantly greater reduction in VAS score (mean Δ = 4.93) than Group B (mean Δ = 2.80; t = 7.03, p<0.001), and a significantly greater reduction in PFIQ-7 score (mean Δ = 60.80 vs 34.40; t = 5.61, p<0.001). This indicates that, although both interventions produced significant within-group improvement, Group A achieved a significantly greater magnitude of improvement in both pain (VAS) and pelvic-floor-related quality of life (PFIQ-7) than Group B.

DISCUSSION

The present study was conducted to evaluate the effects of sound wave therapy using tuning fork with pelvic floor exercises in athletes aged between 18-40 years following pelvic floor Dysfunction or related symptoms, with the primary aim of determining which group intervention or control provides better functional outcomes. A total of 30 participants were included and assessed pre- and post-intervention using standardized outcome measures, the VAS (Visual Analog Scale) and PFIQ-7(Pelvic floor impact questionnaire).

When the findings of the present study are compared with the existing literature/ research, it is evident that pelvic floor exercises or pelvic floor muscle training are consistent and strongly support the findings

reported in previous studies. TUFA A, TEODORESCU S (2022) published article aimed to design a exercise protocol to reduce or eliminate symptoms related to urinary incontinence in athletic population and reported that pelvic floor muscle training or pelvic floor exercises with correction of muscle imbalance and posture helps to improve quality of life, reduce the urine leakage and improve sports participation . These findings are highly correlated with the results of the present study and support our findings. An article reviewed by Dumoulin C et al. (2015) on the management of urinary incontinence reported that pelvic floor muscle training is better in women's with stress incontinence or urinary incontinence. These findings are consistent with the results of the present study and further support our outcomes. Pires TF et.al,(2020) conducted a study to evaluate the effectiveness of PFMT in the prevention and treatment of SUI in young athletes. Findings of the study suggest PFMT protocol is essential to control the symptoms. These findings are consistent with the results of the present study and further support our outcomes.

The existing literature consistently supports the effectiveness of exercise-based rehabilitation in improving clinical outcomes, and numerous studies have demonstrated its beneficial effects in reducing symptoms and enhancing functional performance. The findings of the present study are in agreement with this evidence. However, there is currently limited direct scientific evidence supporting the integration of sound healing within conventional physiotherapy protocols. Although some complementary and alternative medicine literature suggests that sound-based interventions may promote muscle relaxation, reduce stress, and facilitate the healing process, robust clinical evidence remains insufficient.

In the present study, exercise therapy was found to be effective in improving patient outcomes, and the addition of sound healing appeared to provide further clinical benefits. While these preliminary findings suggest a potential complementary effect of sound healing, the intervention was evaluated over a relatively short duration of six weeks and involved a limited sample size. Therefore, the observed additional benefits should be interpreted with caution.To establish the effectiveness of sound healing as an adjunct to physiotherapy, future studies should include larger sample sizes, more rigorous inclusion and exclusion criteria, and longer

follow-up periods. Such research would help validate the present findings and determine whether sound healing can be incorporated as an evidence-based complementary intervention within physiotherapy practice. Although the intervention period was limited to 6 weeks but both rehabilitation protocols produced satisfactory clinical improvements.

CONCLUSION

The present study was conducted to evaluate the effects of sound healing using tuning fork with pelvic floor exercises in athletes following Pelvic floor DYSFUNCTION or related symptoms, with the primary aim of determining which intervention provides better functional outcomes. A total of 30 participants were included and assessed pre- and post-intervention using standardized outcome measures, the VAS (Visual Analog Scale) and PFIQ-7(Pelvic floor impact questionnaire).The results of the present study demonstrated that both the intervention and control groups showed improvement following the treatment program. Participants in both groups experienced a reduction in symptoms; however, the magnitude of improvement differed between the two interventions. The findings suggest that the exercise program played a significant role in reducing symptoms and improving function, while the addition of tuning fork (sound wave therapy/sound healing) appeared to provide further clinical benefits. These additional effects may have enhanced the overall treatment outcomes observed in the intervention group. Based on the overall trend of improvement from baseline, the findings may be considered clinically satisfactory. These results suggest that both treatment approaches were effective in producing beneficial changes, although neither intervention demonstrated a markedly superior effect over the other.

The present study showed that the sound wave using tuning fork with exercises has the advantage of reducing pain and effective in reducing the disability. The result of the study can be applied clinically to assist healthcare worker, professionals to manage pelvic floor dysfunction/ disorder or related symptoms better. Additional study with large number of sample size with more significant inclusion and exclusion criteria are needed them to validate the results.

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