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EFFECTIVENESS OF PILATES AND SELF MOBILIZATION TECHNIQUES IN MANAGEMENT OF EARLY STAGES OF ANKYLOSING SPONDYLITIS – A COMPARATIVE STUDY

Physiotherapy

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ABSTRACT

Study design: Comparative study.
Objective: The purpose of this study was to determine the effectiveness of Pilates and self mobilization techniques in the management of early stages of ankylosing spondylitis.
Background: Ankylosing spondylitis is a chronic inflammatory disease of spine. Pain, reduced mobility, deformity of spine, associated with this condition have a dramatic impact on physical functioning and quality of life. However there are no clinical studies to demonstrate the efficacy of any particular intervention for treating early stages of ankylosing spondylitis.
Methods: This was a prospective study which included 20 subjects with ankylosing spondylitis, who were randomly divided into two groups. Subjects in group I received Pilate's exercises and conventional therapy and subjects in group II received self Mobilization exercises and conventional therapy. Subjects were evaluated at the beginning of the intervention program and at the end of four weeks using VAS (visual analogue scale) for pain intensity, BASMI (Bath ankylosing spondylitis metrology index) for spinal mobility, BASDAI (Bath ankylosing spondylitis disease activity index) to determine entire spectrum of disease and BASFI (Bath ankylosing sponylitis functional index) to determine degree of functional limitation.
Results: A statistically significant difference in improvement in terms of the VAS, BASMI, BASDAI, BASFI score ($p<0.05$) was noted within the groups. However, no significant difference in terms of VAS, BASMI, BASDAI, BASFI ($p>0.05$) was noted between the two groups.
Conclusion: Pilates is as effective as self mobilization exercises to improve flexibility of spine over a period of four weeks.

KEYWORDS

Ankylosing spondylitis, self mobilization exercises.

INTRODUCTION

Ankylosing spondylitis (AS) is derived from Greek word "ankylos" meaning stiff or bent, and "spondylos" meaning spinal vertebrae. Ankylosing spondylitis (AS) is a chronic inflammatory disease of the spine with insidious onset, usually beginning in early adulthood. It is clinically characterized by low back pain, morning stiffness and forward bending of the spine. Progressive stiffness or ankylosis of the spine, iritis, recurrent prostatitis and peripheral joint involvement are the typical manifestations of the disease[1].

AS is a disease of young people, with onset of symptoms usually in the early third decade of live and almost never after 45 years of age [2]. AS has a strong association with the HLA-B27 antigen, not more than 1-2% of HLA-B27 positives individuals will develop AS. About 15% of the patients have disease onset before 16 years of age. It takes several years after onset for typical radiological signs of AS to be seen on radiographs of the SI joints and lumbar spine. This is in part the reason for the prolonged diagnostic delay in this disease.

Radio-graphically it is characterized by sacroiliitis, erosions of the joint cartilage, joint space narrowing and subsequent ankylosis, are the classical imaging signs of AS. Sacroiliitis with syndesmophyte formation can extend up the entire vertebral column in severe cases, which causes the vertebral column to be fixed and immobile seen in advanced stage of disease leading to ankylosis of the SI joints and the formation of bamboo spine. Arthritis of peripheral joints, costochondritis and enthesopathy, especially of the Achilles tendon insertion, are also commonly seen in AS. MRI showing bone oedema and subchondral or chondral changes in the SI joints are the characteristic features for AS[3].

Exercise is considered as a fundamental tool for the management of the ankylosing spondylitis (AS), in combination with the pharmacological therapy i.e., NSAIDS, DMARDS, sulfasalazine with the advent of biological drugs like TNF inhibitors, infliximab, adalimumab has improved dramatically the control of signs and symptoms of this challenging disease. However, medical therapy alone has never been considered sufficient in clinical management of AS patients without physical therapy. Exercise is known to contribute substantially to AS treatment by preserving spinal flexibility, preventing postural deformities, improving muscle strength and reducing pain[4].

Pilates body conditioning method, which was developed by Joseph H Pilates during First World War and enhanced and refined over next 50 years, contains over 500 stretching and strengthening exercises. Joseph believed that all muscles of the body should be strengthened and stretched, with major emphasis placed upon the muscles of the center, or core, of the body, which he referred to as the power house of the body[5]. Manual therapy is a traditional method of physiotherapy, emphazing on spinal mobility, Self and manual mobilization exercises have shown a significant improved in improving the chest expansion, posture and spinal mobility in patients with ankylosing spondylitis. [6]

METHODOLOGY

Data was collected from patients referred to the outpatient Department of Physiotherapy & Department of rheumatology, with a clinical diagnosis of ankylosing spondylitis.The study design used for this research was comparative study . For this, ethical clearance was obtained from the institutional ethical committee and informed consent was taken from the patient before commencement of the study. The study sample had 20 subjects consisted of both male and female.

Inclusion Criteria

1. Patient diagnosed as AS.
2. Patient satisfying Modified Newyork criteria for AS(1984)

a) Clinical Criteria :- low back pain and stiffness for more than three months which improves on exercise but not relieved by rest.
b) Limitation of lumbar spine motion in both sagittal and frontal planes.
c) Limitation of chest expansion relative to normal values correlated to age and sex.
d) Radiological criteria :- Sacroillitis grade >2 bilaterally or grade 3-4 unilaterally

3. ASAS Criteria for axial Spondyloarthritis (SPA) in patients with ≥ 3 months back pain and age onset < 45 years.

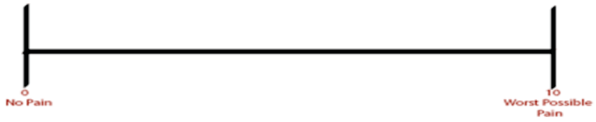
a) Sacroillitis on imaging plus ≥1 SPA feature (or) HLA -B 27 Plus ≥ 2 other SPA features.
b) SPA Features:-
- Inflammatory Back Pain
- Enthesitis (heel)
- Arthritis
- Uveitis
- Dactylitis
- Crohn's disease
- Good response to NSAIDS
- Family history for SPA
- HLA B 27
- Elevated CRP

c) Sacroillitis on imaging :- Active (acute inflammation on MRI highly suggestive of sacroillitis associated with SPA.
- Definite radiographic sacroillitis according to modified new York criteria.

Exclusion Criteria
- Ankylosed spine
- Osteoporotic bone
- Any condition that may mimic or with the lower back pain.
- Presence of neuropathic component.
- Presence of any following red flags of low back pain
- a)unexplained weight loss > 10kg within 6 months
- b)persistent fever
- c)urinary incontinence or retention
- d)saddle anaesthesia
- e)Anal sphincter tone decreased or fecal in continence
- f)Bilateral lower extremity weakness or numbness
- g) Progressive neurologic deficit.
- h) unwilling for regular visits

OUTCOME MEASURES

·VISUAL ANALOGUE SCALE (VAS): Pain was quantitatively measured by visual analogue scale. Here the subjects were shown a 10 centimeter line where one end is marked '0' and other end is marked '10'. They were explained that '0' represents no pain and '10' represents the maximum pain and they were instructed to mark their level of pain over that 10 centimeter scale.[12]



- Bath ankylosing spondylitis functional index (BASFI) is a set of 10 questions designed to determine the degree of functional limitation in people with Ankylosing spondylitis .
- Bath ankylosing spondylitis disease activity index (BASDAI) this questionnaire includes the entire spectrum of AS .
- Bath ankylosing spondylitis metrology index (BASMI) to assess spinal mobility in AS Patient
- Thoracic and lumbar spinal mobility is measured by finger to floor test ,schober's test, maximum flexion and extension test.
- Chest expansion is measured by measuring tape.

ALLOCATION

Following the baseline examination, patients were randomly allocated into two groups by simple random sampling using lottery method. Allocation was concealed.

PROCEDURE

Group I – : receives Pilates exercises (Chest lifts, Book opening, Spine Stretch1&2, Scare Crow, Swan, Dart, Quardipod ,Bridging, Roll up) and conventional therapy.

Group II – receives self manual mobilization exercises (Chin tuck, Cork screw chin tuck, self mobilization exercises for thoracic spine, Standing Lumbar extension and Abdominal drawing in hook lying and in Quadripod position and self shotgun exercises and postural correction exercises & conventional therapy.

Home program given to both groups. Exercises performed with 10 repetitions once daily.

CONVENTIONAL TREATMENT:

Includes pharmacological therapy i.e., NSAIDS, DMARDS Back protection measures, Ergonomics, education of postural correctional techniques.

All participants will receive a booklet containing information about Pilates exercises & self mobilization techniques accordingly to their respective group allotment .This groups will have direct access tothe physiotherapist in charge of the intervention, who will clarify any questions about the information of the booklet. In their first session, the participants from this group will receive an orientation of exercises that are explained in the booklet. Furthermore, they will receive phone calls from the physiotherapist twice a week to inquire about their compliance with the booklet.

The Pilates Group will receive a treatment protocol that consists of specific training with individual Pilates based exercises performed on the ground. Each session will last for 1 hour, and participants in the Pilates group& self mobilization group will complete 3 sessions per week 4 over weeks. Before the start of the exercise program, all participants in the Pilates Group will receive a basic introduction to the Pilates-based exercises and will be trained to activate the powerhouse, which involves isometric contraction of the transversus abdominus, pelvic floor, and multifidus muscles while exhaling during diaphragmatic breathing.

The start of the training program will consist of floor exercises on a rubber mat, including the following: Chest lifts, Book opening, Spine Stretch1&2, Scare Crow, Swan, Dart, Quardipod ,Bridging, Roll up exercises in group A and 3 to 5 minutes of relaxation.

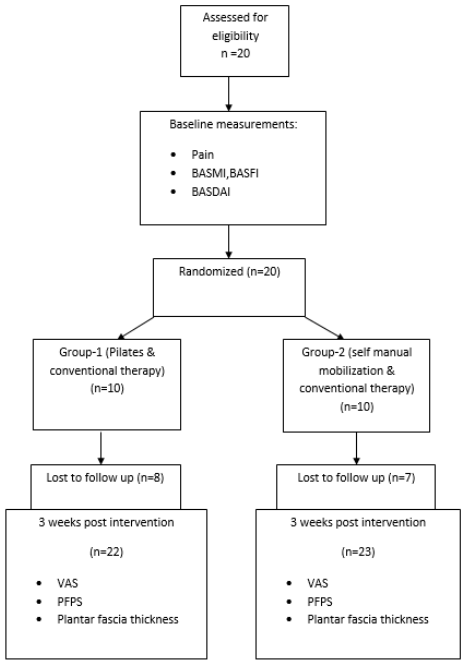
In Group B the training program of self manual mobilization exercises (Chin tuck, Cork screw chin tuck, self mobilization exercises for thoracic spine, Standing Lumbar extension and Abdominal drawing in hook lying and in Quadripod position and self shotgun exercises and postural correction exercises.

The post-test outcome measurement will be assessed for Pain using VAS scale, assessed for spinal mobility using BASMI, assessed for disease activity using BASDAI, assessed for degree of functional limitation using BASFI.

Statistical Analysis:

To determine within group difference between pre and post treatment, Wilcoxon signed rank test for VAS, BASMI, BASFI, BASDAI were used. Mann Whitney test for VAS, BASMI, BASFI, BASDAI were used to determine between group differences.

Figure 1: Flow Diagram Of Patients Throughout The Course Of The Study



RESULTS:

Within group analysis revealed a significant difference between pre and post treatment in both the groups in terms of:

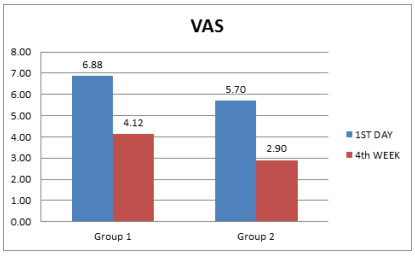
a) VAS: Group I mean pre (6.87) and post (4.12) and calculated Z-value is -2.565 and P-value 0.01(<0.05); Group II mean pre (5.70) and post (2.90) and calculated Z-value is -2.859, P-value 0.04(<0.05).

b)BASMI score: Group I mean pre (.3000) and post (.0750) and calculated Z-value is -2.565 and P-value 0.014(<0.05) ; Group II mean pre(.2600) and post(.1800) and calculated Z-value is -2.000, P-value 0.046(<0.05).

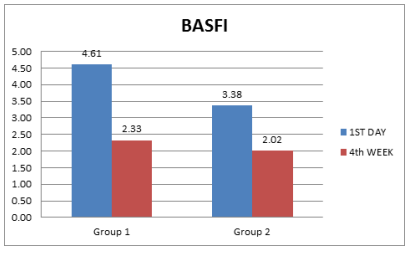
c)BASFI score : Group I mean pre (4.61) and post (2.32) and calculated Z-value is -2.524 and P-value 0.012(<0.05) ; Group II mean pre(3.38) and post(2.02) and calculated Z-value is-2.805 ,P-value 0.005(<0.05).

d)BASDAI score : Group I mean pre (6.018) and post (3.69) and calculated Z-value is -2.521 and P-value 0.012(<0.05) ; Group II mean pre(3.89) and post(2.44) and calculated Z-value is-2.666 ,P-value 0.008(<0.05).

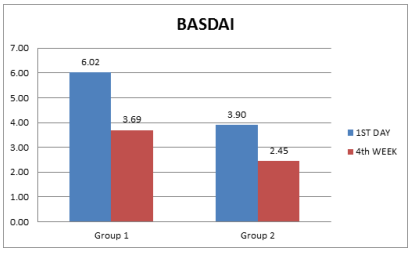
At baseline, there was no significant difference between the two groups in terms of VAS, BASMI,BASFI &BASDAI scores.



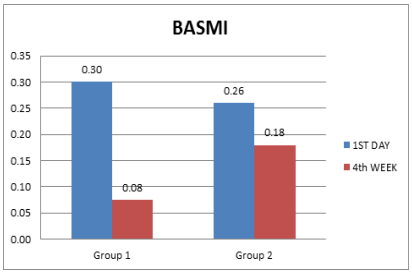
Graph 1: Vas Score



Graph 2 : BASFI Score



Graph 3: BASDAI Score



Graph 4: BASMI Score

DISCUSSION:

The study is conducted to compare the effectiveness of Pilates and self mobilization exercises to reduce pain and to improve the range of motion and to reduce functional disability .

As groups were selected according to criteria described in methodology and there is no interaction between patients selection and all 20 subjects are randomly and independently allocated into two groups. Both the groups were assessed for pain (VAS), Bath ankylosing spondylitis functional index (BASFI), Bath ankylosing spondylitis disease activity index (BASDAI), Bath ankylosing spondylitis metrology index (BASMI) . All the parameters were measured at baseline (0th week) and 4th week following completion of the intervention for 08 subjects in group1 and 10 subjects in group2 successfully. At the end of 4th week, 2 dropouts (2 in group1)for their personal reasons.

PAIN

There was significant difference in mean pain scores of Pilates group and Self mobilization exercise groups when compared after 6th week of treatment. The results have shown a trend in the improvement of pain intensity over the 4 weeks period in two groups. The study suggests that four weeks of Pilates group, with self mobilization exercise group significantly does not differ in reducing pain in patients suffering from early stages of Ankylosing spondylitis.

The current study demonstrates that both groups showed significant improvement in pain relief over a period of four weeks. Hence it is in agreement with the study of Altan[5] et all 2012 and kyilliwki widberg[6]et all 2011 stating that pain relief and improving flexibility of spine and functional disability with a supervised exercise program.

The findings of the present investigation indicate that pain has reduce significantly in both groups evident by the mean values of group1 in baseline 6.87 and in 4thweek is 4.12; and mean values of group2 at baseline is 5.70 and in 4th week is 2.90 and calculated Wilcoxon signed rank test (Z-value) for group1 is -2.565 (p-va lue: 0.01 less than 0.05) and for group2 is -2.859(p-value: 0.04less than 0.05) . At the end of 4thweek comparingthe mean values of VAS of Pilates group and self mobilization exercises group calculated by using Mann-Whitney test, Z value is-1.072 and its p-value 0.315 is greater than 0.05, showing no significant difference between group1 and group2.

BASFI

A statistically significant difference exists between group1 and group2 from baseline to 4th week , the mean values of flexion of group1 in the baseline is 4.61 and in 4th week is 2.26 and the mean values of BASFI of group2 in baseline is 3.38and in 4th week is 2.02 and calculated Z value of group1 and group2 from baseline to 6th week are -1.296 (p-value is 0.203 greater than 0.05) and -0.490 (p-value: 0.633 greater than 0.05).so No significant difference exist between group1 and group2.

BASDAI

A statistically significant difference exist between group1 and group2 from baseline to 4thweek in extension , the mean values of extension of group1 in the baseline is 6.01 and in 4th week is 3.69 and the mean values of extension of group2 in baseline is 3.38 and in 4th week is 2.02 and thier calculated Z value of group1 from baseline to 4th week is - .290 (P-value 0.771 greater than 0.05) and -1.068 where p-value is 0.315 greater than 0.05 so statistically no significant difference exist between group1 and group2.

CONCLUSION

Pilates is as effective as self mobilization exercises to improve flexibility of lumbar spine over a period of four weeks. A significant differences of Outcomes were noticed within the groups. Not much significant difference of VAS, BASMI, BASFI and BASMI is noticed in between the groups. Further studies are needed with larger sample size and long term follow up.

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