



## Review Article

### Effect of Supervised Physiotherapy in Ankylosing Spondylitis.

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#### Abstract

Ankylosing spondylitis affects the most productive period of life. Mainstay of treatment of this condition is physiotherapy along with the pain killing medications. Passive stretching and intensive in-patient physiotherapy courses have been offered in western countries. All these courses are in-patient based physiotherapy programs. In this setting, Supervised Physiotherapy, a form of out-patient based therapy was offered to find out its effectiveness among these patients.

A prospective case control study was carried out over 135 patients with AS in the Department of Physical Medicine and Rehabilitation, Bangabandhu Sheikh Mujib Medical University (the then IPGMR), Dhaka. The study was done during a period of 8 years from March 1992 to April 2000 to see the effectiveness of the supervised physiotherapy. 127 subjects, 65 in group (Supervised Physiotherapy) and 62 in the group B (control group) have completed the study. At the end of six months study period all the parameters in the supervised group are significantly improved ( $P < 0.001$ ), except intermaleolar straddle of the female patients. Parameters for the female patients are also improved but not significantly. All the parameters in the control group have also improved significantly for the male patients. Female patients did not show significant improvement. On comparison of the two groups after the study period, Finger to Floor distance in the male patients and Lumber flexion and Tragus to wall distance in female patients had significant ( $p < 0.001$ ) improvements. The results had demonstrated the effectiveness of the six months supervised physiotherapy. Supervised physiotherapy may be a good alternative of inpatient intensive physiotherapy for ankylosing spondylitis.

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#### Introduction

Ankylosing Spondylitis (AS) is an inflammatory disorder of unknown aetiology that primarily affects the axial skeleton; peripheral joints and extra-articular structures may also be involved<sup>1</sup>. Pathological changes in the spine and in

peripheral joints cause reduction of flexibility. Fibrous tissue is being continuously laid down as a result of the mild inflammation and regular physiotherapy with a modified exercise program moulds this fibrous tissue along the lines of stress which do not restrict the movements of the

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patients<sup>2</sup>. Limitations of spinal mobility are the clearest indication of the progression of the disease<sup>3</sup>. Approximately 10% of the patients with AS become significantly disabled within 20 years from the diagnosis of the disease<sup>4,5</sup>. There is no definite treatment of ankylosing spondylitis<sup>6</sup>. Treatment of AS has changed from immobilization in plaster to different types of therapy designed to increase the mobility of the patients<sup>7</sup>. Drugs have not been shown to alter the natural course of AS, consequently the drug therapy is largely empirical. Recently Sulphasalazine and Methotrexate has become the most widely used disease modifying agents in AS with peripheral arthritis as well as axial forms of the disease<sup>8-11</sup>. Some other study shows disease-modifying drugs do not have a role in the treatment of chronic AS<sup>12</sup>. All of these drugs cause significant side effects and there is lack of data on their long-term safety. The role of physiotherapy in AS is very significant. Basic concept is regular training and extension exercises twice daily have been recommended as a minimum<sup>13</sup>. Few studies with inpatient physiotherapy were successful, but that was mostly retrospective studies<sup>14,15</sup>. The purpose of this prospective study is to show the effect of supervised physiotherapy on spinal mobility in ankylosing spondylitis.

### Materials and Methods

This randomized controlled trial was conducted in the Department of Physical Medicine and Rehabilitation, Bangabandhu Sheikh Mujib Medical University, Shahbag, Dhaka (the then IPGMR) during March 1992 to August 2000. Patients diagnosed to have AS on the basis of Modified New York Criteria for ankylosing spondylitis<sup>16</sup>. Following appropriate clinical and laboratory evaluation patients with the age group between 15 years to fifty-five years were included in the study. Patients with active peripheral joint arthritis were excluded from the study. Informed consent was taken before entry into the trial. The subjects were randomly allocated into either supervised (Group-A) or control group (Group-B). All patients admitted to the study were instructed to remain taking same medical therapy and not to seek medical attention for the condition during the

study period unless there is an emergency. The period of study was set for six months.

**Group-A**, (Supervised physical therapy group): The subjects of this group as allocated by randomization received supervised physical therapy which include 30 minutes exercise in the gymnasium (in the Department of Physical Medicine and Rehabilitation, BSMMU, Dhaka). The physiotherapist in charge first demonstrated the set of exercise and then he supervised every patient while performing the exercise set. The overall supervision was done by the physiatrist. The patients move, stretch, and rotate back, hip, shoulder and neck as much as they can in the directions as the mobilizing exercise. Then they go for chest expansion and stretching exercises for the hip and spinal extensors. This set of exercise was repeated for chest expansion and stretching exercises for the hip and spinal extensors. This set of exercise was repeated for twice weekly sessions for six months.

**Group-B**, (Unsupervised physical therapy): Patients of this group received the same exercise regime to that of group A; first time the exercise set was demonstrated by the physiotherapist, and advised to continue the same at the rate of two times in a week. This was a home program.

The study period was set for six months. The base line measurements were taken before the institution of the program and final measurements were taken at the end of the study period.

### Following measurements were used in the trial

**Lumbar Flexion (LF)**: This is the distance between two skin marks at the level of sacral dimples and 10cm above, measured with a tape in cm. after maximum forward bending.

**Chest expansion (CE)**: This is the measurement of the chest circumference at the level of 4<sup>th</sup> intercostal space, the difference of maximal inspiration and expiration is measured with a tape in cm.

**Finger to floor distance (FFD)**: This is the distance between fingertips and floor measured with a tape in cm at maximum flexion of spine while the knees are kept straight.

**Tragus to wall distance (TWD):** This is the distance between tragus and wall, measured with a tape in cm while the patient stands on heels and back against a wall and tries to get the occiput against the wall.

**Inter-maleolar straddle (IMS):** This is the distance between two medial malleolus of tibia measured with a tape in cm at maximum abduction of the both hips.

### Statistical analysis

The results for each patient taken before therapy (BT) and after therapy (AT) were compared and the differences of the measurements were subjected to statistical analysis employing the students paired t test. Inter-group analyses of differences between the variables were done by student's un-paired t test.

### Results

According to random order 70 subjects were included in the supervised group (group A) and 65 five in the controlled group (group B). Six subjects dropped out (four from group A and two from the B group) during the trial. Two subjects were excluded from the study one due to road traffic accident and another due to development of pulmonary fibrosis.

**Table-1:** Characteristics of the studied patients.

Parameters	Group A (n=65)		Group B (n=62)	
	Mean (yrs)	Range (yrs)	Mean (yrs)	Range (yrs)
Age	24.55	15-55	27.50	16-55
Age of onset	22.75	15-50	23.75	15-45
Duration of disease	9.8	1-35	10.5	2.5-38

**Table-2:** Movement status on admission (BT)

Parameters	Group A		Group B	
	Mean	SD	Mean	SD
Lumber Flexion (cm)				
Male (n=47)	2.43	1.21	2.68	1.15
Female (n=18)	2.89	1.11	2.54	1.45
Chest Expansion (cm)				
Male (n=47)	3.37	1.60	3.64	1.74
Female (n=18)	3.66	1.05	2.69	1.38
Tragus-wall Distance (cm)				
Female (n=18)	18.18	4.72	18.47	6.30
Male (n=47)	17.17	4.28	18.12	5.63
Finger-Floor Distance (cm)				
Male (n=47)	21.81	9.00	21.54	11.93
Female (n=18)	19.95	8.65	16.83	8.79
Intermaleolar straddle (cm)				
Male (n=47)	82.72	11.21	78.32	16.11
Female (n=18)	81.21	9.27	59.49	25.70

The studied patients were in the 15-55yrs age group with a mean age of 26.74 years. There was a mean delay of 6.56 years before the diagnosis was made.

Table-2 shows the results of movement status on admission in the study. As the patients had different degrees of disability. The range of measurements obtained in each category was large. Means and standard deviations at base line are shown in Table-2.

At the end of six months physiotherapy course, patients in the supervised group (Group A) showed significant increase ( $p < 0.001$ ) in the range of each movement except the intermaleolar straddle for the female patients as demonstrated in Table-3.

In the control group, (Group B, Table-4) male patients were significantly improved in all the parameters. For the female patients, the parameters were improved from the base line but do not show significant improvement.

The differences between the two groups for the movements at the end of the Physiotherapy course are shown to be statistically significant except for the lumber flexion and intermaleolar straddle (Table-5)

**Table-3: Movement status on admission (BT)**

Parameters	Before Physiotherapy		Before Physiotherapy		Difference between means	P Value
	Mean	SD	Mean	SD		
Lumber Flexion (cm)						
Male (n=47)	2.43	1.21	2.60	1.25	0.1745	<0.001
Female (n=18)	2.89	1.11	3.10	1.16	0.2117	<0.001
Chest Expansion (cm)						
Male (n=47)	3.37	1.60	3.56	1.63	0.1847	<0.001
Female (n=18)	3.66	1.05	3.91	1.15	0.2439	<0.001
Tragus-wall Distance (cm)						
Male (n=47)	18.18	4.72	16.73	4.37	1.4457	<0.001
Female (n=18)	17.17	4.28	15.63	3.91	1.5361	<0.001
Finger-Floor Distance (cm)						
Male (n=47)	21.81	9.00	18.87	9.17	2.9426	<0.001
Female (n=18)	19.95	8.65	16.83	8.79	3.1222	<0.001
Intermaleolar straddle (Cm)						
Male (n=47)	82.72	11.41	85.54	11.91	2.8136	<0.001
Female (n=18)	81.21	9.27	84.18	8.67	2.9694	<0.01

**Table-4: Control Group B**

Parameters	Before Physiotherapy		After Physiotherapy		Difference between means	P Value
	Mean	SD	Mean	SD		
Lumber Flexion (cm)						
Male (n=45)	2.68	1.15	2.82	1.18	0.1442	<0.001
Female (n=17)	2.54	1.45	2.57	1.44	0.0247	<0.01
Chest Expansion (cm)						
Male (n=45)	3.64	1.74	3.73	1.79	0.0920	<0.001
Female (n=17)	2.69	1.38	2.87	1.37	0.1829	<0.05
Tragus-wall Distance (cm)						
Male (n=45)	18.47	6.30	17.61	6.35	0.8644	<0.001
Female (n=17)	18.12	5.63	17.97	5.58	1.1471	>0.05
Finger-Floor Distance (cm)						
Male (n=45)	21.54	11.93	20.27	12.08	1.2611	<0.001
Female (n=17)	18.50	11.81	17.69	10.92	0.8176	>0.10
Intermaleolar straddle (Cm)						
Male (n=45)	78.32	16.11	80.13	16.79	1.8178	<0.001
Female (n=17)	59.49	25.70	56.99	27.58	2.5006	>0.10

**Table-5: Movement status after Physiotherapy (AT)**

Parameters	Group A		Group B		P Value	
	Mean	SD	Mean	SD		
Lumber Flexion (cm)						
Male (n=47)	+0.17	0.20	Male (n=45)	+0.14	0.14	>0.10
Female (n=18)	+0.21	0.14	Female (n=17)	+0.02	0.03	<0.001
Chest Expansion (cm)						
Male (n=47)	+0.19	0.15	Male (n=45)	+0.10	0.18	<0.05
Female (n=18)	+0.24	0.15	Female (n=17)	+0.07	0.14	<0.01
Tragus-wall Distance (cm)						
Male (n=47)	-1.47	1.31	Male (n=45)	-0.85	1.16	<0.05
Female (n=18)	-1.49	1.34	Female (n=17)	-0.17	0.35	<0.001
Finger-Floor Distance (cm)						
Male (n=47)	-2.27	1.50	Male (n=45)	-1.24	1.06	<0.001
Female (n=18)	-3.121	1.82	Female (n=17)	-0.82	2.49	<0.01
Intermaleolar straddle (cm)						
Male (n=47)	+2.60	2.44	Male (n=45)	+1.86	2.17	>0.10
Female (n=18)	+3.53	2.61	Female (n=17)	-2.50	12.50	>0.05

## Discussion

The present study was designed to see the effect of supervised physiotherapy in comparison with unsupervised form of physiotherapy. The study has demonstrated the benefit of 6 months physiotherapy course. With careful instructions and supervision patients were able to perform the exercise regime over the 6 months study period. Patients in supervised group showed significant improvement ( $p < 0.001$ ) of spinal mobility especially the parameters that measured lumber, chest and neck movements. Ankylosing spondylitis is often first diagnosed when patients are 20-30 years old<sup>17</sup>. Disability as a consequence, affects the patients for a considerable part of their lives. W. N. Roberts and associates showed 3-week intensive inpatient physical therapy course that produces significant improvement of lumber flexion, chest expansion and cervical rotation<sup>18</sup>. Anecdotal, but less easily quantifiable evidence of improvement was also common in our series. For example, some patients lying flat on the bed were unable to get the occiput to the mat on the bed and at the end of the physiotherapy course they were able to do so. This might be due to an increase in spinal mobility. During 1978, O'Driscoll and colleagues repeated certain neck movements three months after the initial physiotherapy course; they found no deterioration in neck mobility<sup>19</sup>. They also reported significant improvement of cervical spine mobility after 3 weeks inpatient physiotherapy course. The changes we recorded match fairly well with these in magnitude. Short-term studies of treatment efficacy in ankylosing spondylitis have pain relief and change in physical measurements<sup>20, 21</sup> and long term studies explained employment or functional status of these patients<sup>22</sup>. Intermaleolar straddle that measures bilateral abduction of hip joints was not improved significantly with this short-term study. SJ Bulstrode and colleagues from the Royal National Hospital for Rheumatic Diseases in UK has demonstrated the short-term effectiveness of the

stretching program<sup>15</sup>. But their study was designed for passive stretching in contrast to our active supervised therapy. In the study of Tomilson and co-workers<sup>14</sup> has demonstrated the improvement in spinal mobility pronounced in females than in males in contrast to our findings. Methodology of measurements used in both of these studies was not exactly the same and our socio-cultural factors towards ladies may also be influencing the study results.

We are convinced that the present study support the conception of institutional rehabilitation and physiotherapy as was in the retrospective study done by JV Vitanen and colleagues<sup>3</sup>. While improvement in mobility is important in itself, the influences of comprehensive rehabilitation are still greater and further study on this respect is recommended.

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