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Functional Outcome of McKenzie Exercise in Patients with Ankylosing Spondylitis- A Single Center Study in Bangladesh

Dr. Iftakharul Alam[1*], Dr. Nusrat Neherin Khan[2], Dr. Suriya Shahaly[3], Dr. Reshad Aldin Ahmed[4], Prof. Dr. A K M Salek[5], Prof. Dr. Taslim Uddin[5]

[1]Consultant, Department of Physical Medicine and Rehabilitation, Anwar Khan Modern Medical College Hospital, Dhaka, Bangladesh
[2]RMO, Ibrahim Cardiac Hospital & Research Institute, Dhaka, Bangladesh
[3]Associate Consultant, Women and Child Hospital, Dhaka, Bangladesh
[4]SMO, Care Bridge Psychiatry and Drug Addiction Recovery Clinic, Dhaka, Bangladesh
[5]Professor, Department of Physical Medicine and Rehabilitation, Bangabandhu Sheikh Mujib Medical University (BSMMU), Dhaka, Bangladesh

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***Corresponding Author:** Dr. Iftakharul Alam, Email: iftakhar23@gmail.com
Consultant, Department of Physical Medicine and Rehabilitation, Anwar Khan Modern Medical College Hospital, Dhaka, Bangladesh

Abstract

Background: Ankylosing spondylitis (AS) is a common inflammatory rheumatic disease that affects the axial skeleton, causing inflammatory back pain and can lead to structural and functional impairments. On average, ankylosing spondylitis (AS) incidence rates range from 0.2% to 1% of the adult population. McKenzie exercise seems to be beneficial for those affected by AS, in particular when it is planned according to the needs of the individual aiming to maintain or improve the level of physical fitness. The prevalence of AS is generally believed to be between 0.1% and 1.4% globally. ***Aim of the study:*** The aim of this study was to evaluate the functional outcome of McKenzie exercise in patients with ankylosing spondylitis. ***Methods:*** This was a comparative experimental study which was conducted in the Department of Physical Medicine and Rehabilitation, BSMMU, Dhaka, Bangladesh from October 2019 September 2020. The study was approved by Institutional Review Board (IRB) of BSMMU on. A total of 112 patients with ankylosing spondylitis were selected who were divided into two groups. 56 patients were allotted in group A (NSAID group) and another 56 patients were allotted in group B (NSAID with McKenzie exercise). Collected data were processed, analyzed and disseminated by using MS Excel and SPSS version 23.0 program as per necessity. ***Results:*** The mean VAS score at baseline was 34.44 ±2.78 in group A and 34.03±2.23 in group B, at 4 weeks 28.89±3.67 in group A and 21.23 ±3.57 in group B, at 8 weeks 30.59 ±3.69 in group A and 16.95±3.62 in group B and at 12 weeks 28.08±3.34 in group A and 15.04 ±3.77 in group B. The mean BASFI at baseline was 3.19±0.15 in group A and 3.51±0.18 in group B, at 4 weeks 2.99±0.15 in group A and 2.15±0.05 in group B, at 8 weeks 1.99±0.09 in group A and 1.26±0.22 in group B and at 12 weeks 2.01±0.09 in group A and 1.25±0.2 in group B. The mean BASDAI at baseline was 5.01±0.39 in group A and 4.95±0.4 in group B, at 4 weeks 3.99±0.07 in group A and 3.43±0.09 in group B, at 8 weeks 3.97±0.09 in group A and 3.02±0.07 in group B and at 12 weeks 3.49±0.06 in group A and 1.98±0.09 in group B. The differences of VAS score, BASFI and BASDAI at 4, 8 and 12 weeks were statistically significant ($p<0.05$) between two groups. ***Conclusion:*** Ankylosing spondylitis (AS) causes pain and stiffness to affected joints and the spine and if the disease progresses, it can cause fusion of the joints, which can limit a person's mobility and flexibility. In analyzing the outcomes of McKenzie exercise in patients with ankylosing spondylitis the differences of VAS score, BASFI and BASDAI at 4, 8 and 12 weeks were found as statistically significant ($p<0.05$) between NSAID group and NSAID with McKenzie exercise patient groups.

Keywords: Functional outcome, McKenzie exercise, Ankylosing spondylitis, Back pain.

INTRODUCTION

Ankylosing spondylitis (AS) is a common inflammatory rheumatic disease that affects the axial skeleton, causing inflammatory back pain and can lead to structural and functional impairments. McKenzie exercise seems to be beneficial for those affected by AS, in particular when it is planned according to the needs of the individual aiming to maintain or improve

the level of physical fitness. Ankylosing spondylitis (AS) is a common inflammatory rheumatic disease, incidence rates range from 0.2% to 1% of the adult population that affects the axial skeleton, causing characteristic inflammatory back pain; it can lead to structural and functional damages and a decrease in quality of life [1]. The association of other joints as the complex articulation of the hip may be present [2, 3]. Symptoms of the disease appear in average around 23 years of age and men are 2 to 3 times more likely to be affected than women [4]. AS includes inflammation and pain in many joints and spine, which cause physical outcomes such as reduced physical activity, reduced spinal mobility, stiffness, fatigue, sleep disturbances and psychological consequences such as depression [5, 6]. Ince *et al.,* [7] reported beneficial effects of exercise on symptom severity, spinal mobility, muscle strength, functional capacity, cardiovascular capacity, and psychological status. Therefore, physical exercise is the cornerstone of the management program in AS. Taslim *et al.,* [8] undertaken a study to find out the effect of supervised physiotherapy in comparison with unsupervised form of physiotherapy. However, this study was to find out the effect of McKenzie exercises on functional improvement in patients with ankylosing spondylitis. In physical therapy the McKenzie method is a comprehensive method of care primarily used. New Zealand physical therapist Robin McKenzie, OBE (1931-2013) [9] developed the method in the late 1950s [10, 11]. In 1981 he launched the concept which he called Mechanical Diagnosis and Therapy (MDT) which is a system encompassing assessment, diagnosis and treatment for the spine and extremities. MDT categorized patients' complaints not on an anatomical basis [12, 13] but subgroups them by the clinical presentation of patients [14]. Although, there is a lack of standardized or uniform physical therapy approach for patients with chronic low back pain, recent reports suggest that the McKenzie exercise may improve pain and disability in such settings [15, 16]. Among different forms of physical therapy, McKenzie method is actually recognized as a standardized approach to both the assessment and the treatment of mechanical lower back pain; it is not a simple set of exercises, but a comprehensive algorithm that serves to classify the spinal problem so that it can be adequately treated. The main component of this method is an exercise protocol which consists of sustained postures or repeated movements, similar to the strategies for specific diseases of the spine specifically designed to centralize or alleviate the pain [17, 18]. Furthermore, the McKenzie exercise emphasizes the importance of postural education and active involvement of the patient in the rehabilitation program, promoting the decrease of pain and restoring the flexibility of the spine [17]. In addition, McKenzie exercises support the auto-passive and active extension of the lumbar spine, with particular significance in regaining spine flexibility and invigorating the posterior structures, favoring a normal posture in lordosis of the lumbar segment [18, 19]. The advantages of McKenzie exercises are generally recognized for a broad spectrum of mechanical low back pain; conversely, limited data is currently available for inflammatory low back pain, particularly in patients with SpA [20]. Until now (September'19), no published studies of the effect of McKenzie exercises of ankylosing spondylitis have been carried out in a representative sample of Bangladeshi population. Therefore, it is clear that, there is a need to observe effect of prescribed McKenzie exercises on patients with AS having pain and disability of people in this country.

METHODOLOGY

This was a comparative experimental study. The study was conducted in the department of Physical Medicine and Rehabilitation, BSMMU, Dhaka, Bangladesh from October 2019 November 2020. The study was approved by Institutional Review Board (IRB) of BSMMU. A total of 112 patients with ankylosing spondylitis were selected as per inclusion criteria. Patients were divided into two groups. 56 patients were allotted in group A (NSAID group) and another 56 patients were allotted in group B (NSAID with McKenzie exercise). Indomethacin was used as NSAID. The slow-release capsules (75mg) were prescribed at night with meal and Omeprazole (20 mg), as proton pump inhibitor were prescribed half hour before meal at morning and at night for twelve weeks. McKenzie extension exercises were performed for 50 minutes three times per week for 12 to 24 weeks. Baseline assessment was done at week-0 and outcome of exercise program were assessed on three consecutive follow up sessions at four week's interval by BASFI Bath Ankylosing Spondylitis Functional Index (BASFT) and I Bath Ankylosing Spondylitis Disease Activity Index (BASDA). The whole intervention was conducted in accordance with the principles of human research specified in the Helsinki Declaration [21] and executed in compliance with currently applicable regulations and the provisions of the General Data Protection Regulation (GDPR) [22]. Data were analyzed and by MS Excel and SPSS version 23.0 program as per necessity.

RESULTS

In this study, among total 112 participants, 29 (51.8%) belonged to age 21-30 years in group A and 31(55.4%) in group B. The mean age was 28.02±5.86 years in group A and 28.8±5.94 years in group B. The difference was statistically not significant ($p>0.05$) between two groups. In each of the groups, 89.3% patients were male. The differences between male-female were statistically not significant ($p>0.05$) in both the groups. In analyzing the medical history of the participants was observed that, 50 (89.3%) patients were associated with NSAIDs in group A and 53(94.6%) in group B which were noticeable. The difference was statistically not significant ($p>0.05$)

between two groups regarding the past medical history. The mean VAS score at baseline was 34.44±2.78 in group A and 34.03±2.23 in group B. The mean VAS score at 4 weeks was 28.89±3.67 in group A and 21.23±3.57 in group B. The mean VAS score at 8 weeks was 30.59±3.69 in group A and 16.95±3.62 in group B. The mean VAS score at 12 weeks was 28.08±3.34 in group A and 15.04±3.77 in group B. The differences of VAS score at 4, 8 and 12 weeks were statistically significant ($p<0.05$) between two groups. The mean BASFI at baseline was 3.19±0.15 in group A and 3.51±0.18 in group B. The mean BASFI at 4 weeks was 2.99±0.15 in group A and 2.15±0.05 in group B. The mean BASFI at 8 weeks was 1.99±0.09 in group A and 1.26±0.22 in group B. The mean BASFI at 12 weeks was 2.01±0.09 in group A and 1.25±0.2 in group B. The differences were statistically significant ($p<0.05$) between two groups. The mean BASDAI at baseline was 5.01±0.39 in group A and 4.95±0.4 in group B. The mean BASDAI at 4 weeks was 3.99±0.07 in group A and 3.43±0.09 in group B. The mean BASDAI at 8 weeks was 3.97±0.09 in group A and 3.02±0.07 in group B. The mean BASDAI at 12 weeks was 3.49±0.06 in group A and 1.98±0.09 in group B. The differences of BASDAI at 4, 8 and 12 weeks were statistically significant ($p<0.05$) between two groups.

Table 1: Distribution of the study patients by age (N=112)

Age (years)	Group A (n=56)		Group B (n=56)		P value
	n	%	n	%	
<20 yrs.	5	8.9	1	1.8	0.482
21-30 yrs.	29	51.8	31	55.4	
31-40 yrs.	22	39.3	24	42.8	
Mean ±SD	28.02±5.86		28.8±5.94		

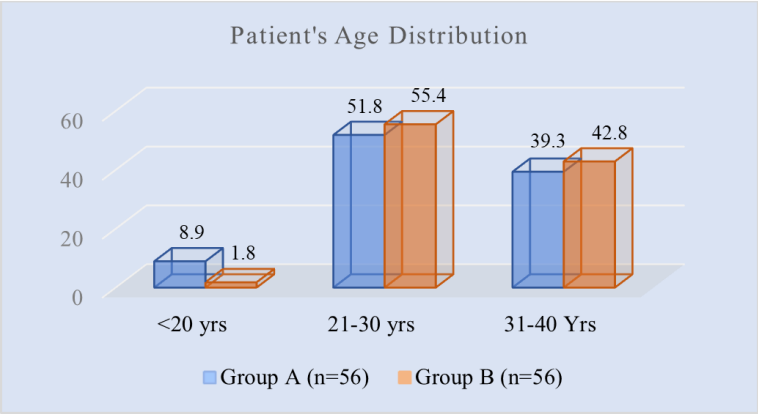

Figure I: Bar chart Showed, Group wise patients by age (N=112)

Table 2: Distribution of the study patients by sex (N=112)

Sex	Group A (n=56)		Group B (n=56)		P value
	n	%	n	%	
Male	50	89.3	50	89.3	1.000
Female	6	10.7	6	10.7	

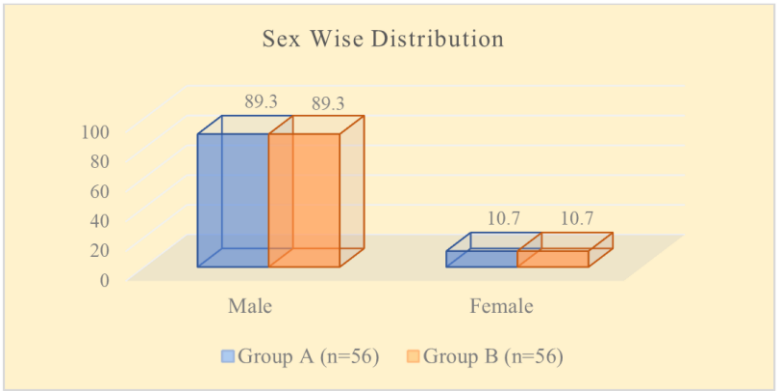

Figure II: Bar chart showed group wise patients by sex (N=112)

Table 3: Distribution of the study patients by past medical history (N=112)

Past medical history	Group A (n=56)		Group B (n=56)		P value
	n	%	n	%	
DM	2	3.6	1	1.8	0.581
Hypertension	4	7.1	2	3.6	
NSAIDs	50	89.3	53	94.6	

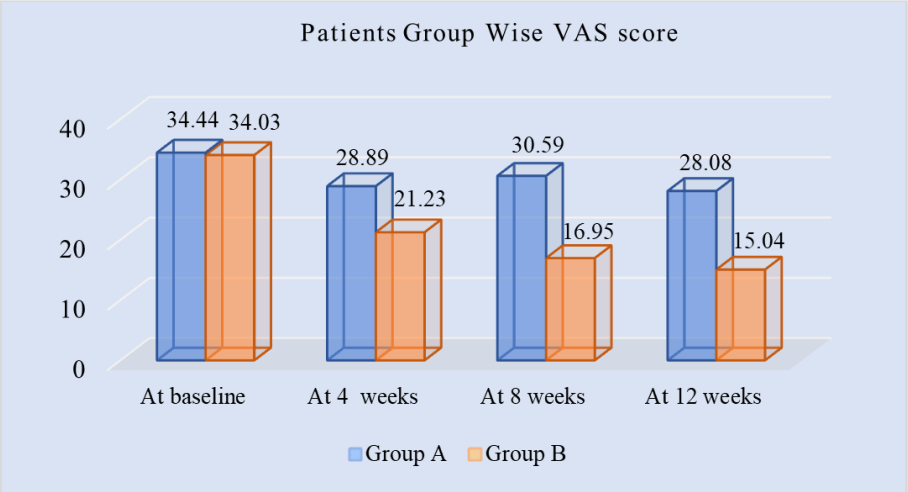

Figure III: Bar chart showed distribution of the study patients by VAS score (N=112)

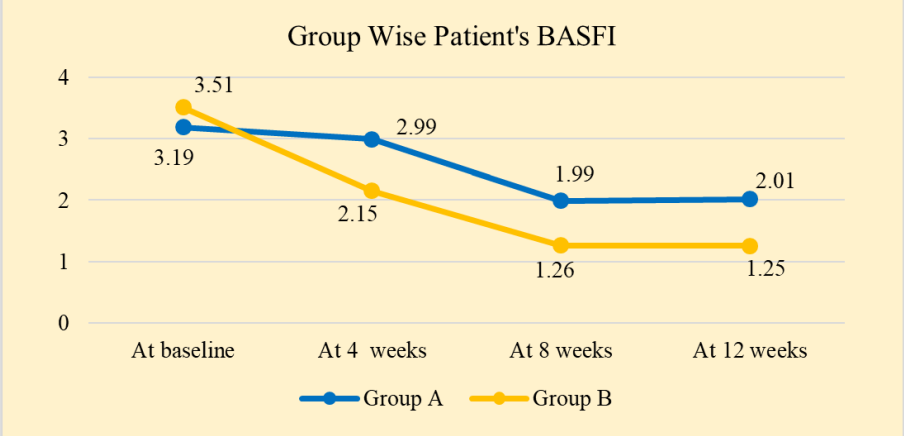

Figure IV: Line chart showed, distribution of the study patients by BASFI (N=112)

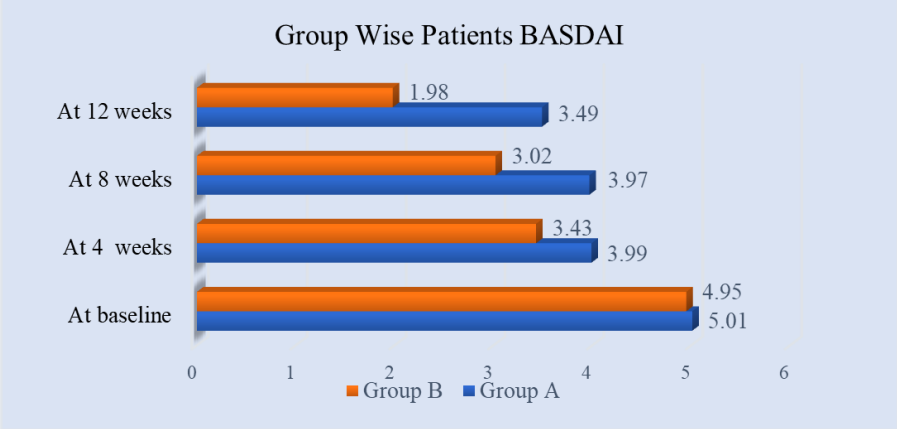

Figure V: Bar chart showed, distribution of the study patients by BASDAI (N=112)

DISCUSSION

The aim of this study was to evaluate the functional outcome of McKenzie exercise in patients with ankylosing spondylitis. In this study, regarding the distribution of the study patients by age, it was observed that, more than half (51.8%) of the patients belonged to age 21-30 years in group A and 31(55.4%) in group B. The mean age was 28.02 ±5.86 years in group A and 28.8 ±5.94 years in group B. The difference was statistically not significant (p>0.05) between two groups. The upper age limit was chosen to ensure a high case identification and at the same time minimize the flawing of the results which could be possibly caused by the inclusion of older individuals. Exarchou *et al.*, [23] also reported that, the prevalence of clinically diagnosed AS increased linearly with age up to the age of 55 years, and then reached a plateau. In all age groups, the prevalence of AS was higher in men than in women (0.23% versus 0.14%; P < 0.001). Although >95% of patients with AS experience disease onset before the age of 45, there is a considerable delay (8 to 15 years) in obtaining a definitive diagnosis from a specialist in Sweden [24, 25], meaning that, a high age limit was required in order to maximize the number of cases enrolled. In this study, regarding the distribution of the study patients by sex, it was observed that fifty (89.3%) patients were male in group A and 50(89.3%) in group B. The difference was statistically not significant (p>0.05) between two groups. The male-to-female ratio was highest after the age of 50; however, it was lower for younger age groups and the same pattern was observed for the prevalence of AS according to the strict case definition after age and sex stratification. The mean weight was 65.55±7.89 in group A and 66.11±8.37 in group B. The mean BMI was 23.23±4.3 kg/m2 in group A and 23.69±3.34 kg/m2 in group B. The difference was statistically not significant (p>0.05) between two groups. In a comparable report, patients were classified according to their BMI in two groups (normal weight ≤24.9 and overweight ≥25). The group of 'normal' weight includes 3.3% patients who were underweight (BMI<18). Obesity was considered if BMI ≥30 (World Health Organization, 2013). The disease activity was measured by BASDAI and by ASDAS. BASDAI consists of six PROs, and has an overall score from 0 to 10; 0 represents inactive disease and 10 extremely active diseases. In this study, the distribution of the study patients by past medical history, it was observed that, fifty (89.3%) patients had NSAIDs in group A and 53(94.6%) in group B. The difference was statistically not significant (p>0.05) between two groups. NSAIDs are commonly used to reduce pain and inflammation, and are recommended as first-line agents for the treatment of AS [26, 27]. In a study [28], it was stated that non-steroidal anti-inflammatory agents (NSAIDs) remain the mainstay of treatment for ankylosing spondylitis (AS) though one trial suggests that continuous as opposed to on-demand use may be superior in preventing progression of structural damage. Authors stated that, the rheumatoid arthritis (RA) and ankylosing spondylitis (AS) are chronic progressive inflammatory diseases, leading to joint damage and reducing the physical fitness of patients [29]. In the McKenzie group, the global level of pain (VAS) showed an important decrease at 12 weeks (P=0.015), maintained at the final evaluation as well (P=0.003); however, only minor non-significant changes in pain level were reported at week 12 (P=0.400) and 24 (P=0.150) in the control group [30]. Spoorenberg *et al.*, [31] clarified that, the disease activity from the patient perspective as well as from the physician perspective was analyzed using the patient's or the physician's global assessment of disease activity by dichotomizing into 'high disease activity' (VAS ¸ 6.0) and 'low disease activity' (VAS=4.0). In our study, the mean BASFI at baseline was 3.19±0.15 in group A and 3.51±0.18 in group B; the difference of BASFI was statistically significant (p<0.05) between two groups. The study also showed that, the mean BASDAI at baseline was 5.01±0.39 in group A and 4.95±0.4 in group B, the mean BASDAI at 4 weeks was 3.99±0.07 in group A and 3.43±0.09 in group B. However, in analyzing the outcomes of McKenzie exercise in patients with ankylosing spondylitis the differences of VAS score, BASFI and BASDAI at 4, 8 and 12 weeks were found as statistically significant (p<0.05) between NSAID group and NSAID with McKenzie exercise patient groups.

Limitation of the Study

Though it was a single center study with small size and conducted at a very short period of time, the findings of this study may not reflect the exact scenario of the whole country.

CONCLUSION & RECOMMENDATION

Ankylosing spondylitis (AS) causes pain and stiffness to affected joints and the spine and if the disease progresses, it can cause fusion of the joints, which can limit a person's mobility and flexibility. In analyzing the outcomes of McKenzie exercise in patients with ankylosing spondylitis the differences of VAS score, BASFI and BASDAI at 4, 8 and 12 weeks were found as statistically significant (p<0.05) between NSAID group and NSAID with McKenzie exercise patient groups. So, as per the findings of this study we can conclude that, McKenzie exercise is an effective treatment method of the management of ankylosing spondylitis.

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