

## Gravity Based and Core Strengthening Exercises on Ankylosing Spondylitis – An Evidence Based Study

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### Abstract:

*Ankylosing spondylitis (AS) a progressive disease limiting physical function and reducing the quality of life is increasing globally, nonpharmacological means with physiotherapy plays a greater role in subjects with AS. Aims & Objectives of this original case study was to analyze the gravity base exercises, core exercises on AS using BASFI index. Materials & Methodology: This study subject was aged 38 years male treated in this study with specific exercises using physioball where gravity was used to mobilize joints and core exercises 5 years from 2012-2017, Results: Pre and post BASFI were analyzed with statistical means with  $P < .01$  Conclusion: outcome of this study findings can be extended for larger subjects with AS and validated*

**Keywords:** Sacroillitis, BASF Index, HLAB 27, Vital Capacity, Kyphosis Rheumatology

### Introduction:

- a. Ankylosing spondylitis is a chronic inflammatory rheumatic disorder that primarily affects the axial skeleton. Sacroillitis is its hallmark accompanied by inflammation of entheses (Points of union between tendons, ligaments, or capsule and bone) and formation of syndesmophytes, leading to spinal ankylosis in later stages (Gran and Husby 2003) but peripheral joints and extra-articular structures may also be affected (Sieper et al 2002)
- b. Early morning stiffness of more than 30 minutes improvement in back pain with exercise but not with exercise, alternating buttock pain, two criteria were found to have high sensitivity and specificity with inflammatory back pain with clinical presentation of AS (Rudwaleit et al 2006)
- c. Also AS is more prevalent in male than female and highest (rate of age onset of AS) with frequency between 25-35 years (Baek et al 2007)
- d. Factors associated with increased risk for advanced stages of the disease were early age at the AS onset, longer delay in diagnosis, lower educational level and smoking (Collishaw 2009) with cigarette
- e. Dietetic factors such as fish oil consumption in Mediterranean diets and mild climacteric factors, exposure to the sun and the ultraviolet radiation may protect against this disease (Vjolica Koko et al 2014)
- f. AS is a chronic disease, that causes considerable pain and disability (Sjef et al 2009) and reduces the quality of life for patients, and it represents a social burden (Kodra 2014)
- g. New York criteria (with 5 criteria) for diagnosis of AS with clinical and radiological evidence (Molland weight 1973 )
- h. With AS most subjects develop hip arthritis and hip replacements should be considered based on pain and radiological evidence of structural damage independent of age (Vander Heijde et al 2005). Spinal surgery may be of value including fusion procedures for segmental instability and wedge lumbar osteotomy for fixed kyphotic deformity (Zochling et al 2006)

**Aims & Objectives** of this research study was to analyze quality of life using BASDAI with specific exercises

**Keywords:** Sacroillitis, BASF Index, HLAB 27, Vital Capacity, Kyphosis Rheumatology

**Materials & Methodology:** This study subject at the age of 38 years male had a low backache and was having sacroillitis with positive HLAB27 and a regular medication by rheumatologist is getting treated with

physiotherapy using gravity based exercises with a frequency of twice a week each session lasts for 30 minutes along with hamstring stretching and core exercises using physioball to both upper extremities and lower extremities in supine, side lying, high sitting and standing during the period from 2012-2017

**Background Information:**

H/O  
 Diagnosed with ankylosing spondylitis with early morning stiffness, lower back pain, and thighs, since 6 years and is getting treated with due medication by rheumatology under physiotherapy treatment by the author from 2012 till today.

**O/E**

- Bilateral hamstring tightness
- Tender lumbosacral and left sacroiliac regions (Grade II)
- Resisted cervical and lumbar spine mobility
- Ambulant unaided, able to drive car and independent for self-care
- Shoulders, hips, knees extreme ranges painful and restricted
- BMI – 22 Kg/m<sup>2</sup>, Waist circumference 90 cm

**Results:**

Table of results on pre and post student ‘t’ test of BASFI

Test	SD	SE	T	P
BASFI 75 Pre				
Post 37	22	12	3.17	<.01

**Nature of Exercises used in this Study:**

Using gravity with physioball, core exercises, hamstring strengthening exercises

**Discussion:**

- Smoking associated with an earlier beginning of spinal pain and higher activity of the disease, also smokers with AS had more physical disability and more advanced radiological damage (Chung etal 2011)
- As is regarded as a chronic progressive disease leading to a variable degree of restricted mobility of the spine with consequent loss of functional capacity (Gran and Husby 1993)
- Beneficial effects of physical therapy on function and disability has been recorded (Baker etal 2007) and cost-effective (Flynn etal 1999)
- Functional disability and pain were higher among patients with AS than in RA as recorded by German rheumatological database (Zink etal 2000)
- Helliwell 1996 have used mainly exercises as main experimental treatment among 44 UK AS subject for 3 weeks with group exercises, hydrotherapy, and individualized home exercises, where pain and stiffness was reduced among supervised exercises in 3 weeks group and no difference was found 6 months after interventions between treatment groups on pain and stiffness hence a moderate quality of evidence for no difference in pain intensity among the groups.
- Analay 2003 among 45 Turkish AS between 15-55 years in a six-week study with supervised intensive exercise program including stretching, mobilization, strengthening aerobic, postural and respiratory

exercises and control group practiced home-based exercise program. After 3 months pain (VAS), duration of morning stiffness physical function, chest expansion shoppers (Lumbar Flexion) have improved significantly among supervised exercise subjects, but the global patient assessment was not measured in both these.

- A Cochrane review on physiotherapy interventions for ankylosing spondylitis with main evidence-based RCT and quasi-randomized studies included supervised exercises for individual patients, supervised exercises for a group of patients, unsupervised exercises, manual therapy, massage, hydrotherapy, spa therapy, electrotherapy, acupuncture and patient information and education (Dag Finrudhagen 2001). Where physiotherapy in ankylosing spondylitis is aimed at maintaining and improving mobility of the spine, and peripheral joints, strengthening the muscles of the trunk, the legs, the back and the abdomen by exercises, stretching of the back and improving fitness by sporting activities (Hiding etal 1993 & Hiding etal 1994) and by relaxation of the body and improving mobility by hydrotherapy (Kraag etal 1990 & kraag etal 1994)
- Patients with ankylosing spondylitis were at increased risk of cardiac mobility including coronary artery disease (Heneman & Daeman 2007)
- The main biomechanical problems in ankylosing spondylitis include limitations in spinal and peripheral joint mobility, restriction of chest expansion (Moll & Wright 1973) reduction of vital capacity (Fransen etal 1986) and deterioration of aerobic capacity (carter etal 1999)
- 2-4 weeks of intense inpatient treatment yields a significant improvement of mobility and pain, and that benefit may persist for months or years (Helliewell eta 1996)
- Van Tuber Gen etal 2002 found that patients with ankylosing spondylitis receiving spa and weekly group therapy including physical therapy, sports, and hydrotherapy for 40 weeks showed improvements in functional ability and quality of life
- Uhrin etal 2000 have shown unsupervised recreational exercises to improve pain and stiffness
- ASAS/ EULAR, suggested that optimal management requires a combination of nonpharmacological and pharmacological treatments and home exercises in category II in evidence of efficacy (Zohling etal 2006)

### Conclusion:

Ankylosing spondylitis a chronic disabling condition resulting in diminishing quality of life where physiotherapy can play a vital role of preserving joint mobility, improve the strength of muscles, enhance physical functions, self-care and promote overall health. Presented with an innovative means of using gravity in this study which is totally unique from a routine, conventional form of physiotherapy.

This study can be extended to larger sample size, using other qualitative variables to measure the outcome of therapy.

**Limitations of this study** being a case study and only select exercises were used, as it requires more validity for to be standardized

### Critical Analysis of this Study Findings

1. Though supervised physioball based exercises used on this subject was safe, supportive outcome measures were not qualitatively measured
2. Biomechanical components involved with mechanism of procedures were not narrated
3. Partial prognosis of the subject was not explained with reasoning

### References:

- i. Gran JT, Husby G. *The epidemiology of ankylosing spondylitis. Semin Arthritis Rheum.* 1993 Apr;22(5):319-34.

- ii. Sieper J, Braun J, Rudwaleit M, Boonen A, Zink A. Ankylosing spondylitis: an overview. *Ann Rheum Dis.* 2002 Dec;61 Suppl 3:iii8-18.
- iii. Rudwaleit M, et al. Inflammatory Back Pain in Ankylosing Spondylitis. *Arthritis & Rheumatism.* 2006;54(2):569–578.
- iv. Barker N., van Es J., Kuipers J., Kujala P., van den Born M., Cozijnsen M., et al. (2007) Identification of stem cells in small intestine and colon by marker gene *Lgr5*. *Nature* 449: 1003–1007.
- v. Collishaw NE, Boyd NF, Cantor KP, et al. Canadian Expert Panel on Tobacco Smoke and Breast Cancer Risk. Ontario Tobacco Research Unit Special Report Series. Toronto, Ontario: Tobacco Research Unit; 2009.
- vi. Vjollca Koko, Ana Ndrepepa, Skënder Skënderaj, Avraam Ploumis, Teuta Backa, Argjend Tafaj. An Epidemiological Study on Ankylosing Spondylitis in Southern Albania. *Mater Sociomed.* 2014 Feb; 26(1): 26-29.
- vii. Sjef M, Van Der Linden, Van Der Heijde D, Maksymowych W. Ankylosing Spondylitis. In: Firestein, Gary S, Budd, Ralph C, Harris, Edward D, editors. *Kelley's textbook of Rheumatology.* 8th Ed. Saunders; 2009. pp. 1169–1190.
- viii. Kodra Y, Cavazza M, Schieppati A, De Santis M, Armeni P, Arcieri R, Calizzani G, Fattore G, Manzoli L, Mantovani L, Taruscio D. The social burden and quality of life of patients with haemophilia in Italy. *Blood Transfus.* 2014 Apr;12 Suppl 3:s567-75.
- ix. Molland V. Wrightt. New York clinical criteria for ankylosing spondylitis A statistical evaluation. *Ann. rheum. Dis.* (1973), 32, 354
- x. van der Heijde D, Dijkmans B, Geusens P, Sieper J, DeWoody K, Williamson P, Braun J; Ankylosing Spondylitis Study for the Evaluation of Recombinant Infliximab Therapy Study Group. Efficacy and safety of infliximab in patients with ankylosing spondylitis: results of a randomized, placebo-controlled trial (ASSERT). *Arthritis Rheum.* 2005 Feb;52(2):582-91.
- xi. Zochling, D. van der Heijde, R. Burgos-Vargas et al., “ASAS/EULAR recommendations for the management of ankylosing spondylitis,” *Annals of the Rheumatic Diseases*, vol. 65, no. 4, pp. 442–452, 2006.
- xii. Chung Ho Yin, Machado Pedro, Heijde Désirée van der, D’Agostino Maria-Antonietta. Smokers in early axial spondyloarthritis have earlier disease onset, more disease activity, inflammation and damage, and poorer function and health-related quality of life: results from the DESIR cohort *Ann Rheum Dis.* 2011;71(6):809–16.
- xiii. Gran JT, Husby G. The epidemiology of ankylosing spondylitis. *Semin Arthritis Rheum.* 1993 Apr;22(5):319-34.
- xiv. Baker Kristen C. Jacobson. Genetic and Environmental Bases of Childhood Antisocial Behavior: A Multi-Informant Twin Study. *Journal of Abnormal Psychology.* American Psychological Association 2007, Vol. 116, No. 2, 219–235
- xv. Flynn PM, Kristiansen PL, Porto JV, Hubbard RL. “Cost and Benefits of Treatment for Cocaine Addiction in DATOS.” *Drug and Alcohol Dependence.* 1999;57(2):167–74
- xvi. Zink A, Braun J, Listing J, Wollenhaupt J. Disability and handicap in rheumatoid arthritis and ankylosing spondylitis: results from the German rheumatological database. *J Rheumatol* 2000;27:613–22.
- xvii. Halliwell B. Antioxidants in human health and disease. *Ann Rev Nutr.* 1996;16:33–50.
- xviii. Analay Y, Ozcan E, Karan A, Diracoglu D, Aydin R. The effectiveness of intensive group exercise on patients with ankylosing spondylitis. *Clin Rehabil.* 2003 Sep;17(6):631-6.
- xix. Dagfinrud H, Hagen K: Physiotherapy interventions for ankylosing spondylitis (Cochrane Review). *Cochrane Database of Sys - tematic Reviews* 2001; 4: Cd002822.

- xx. Hidding A, Van Der Linden S, Boers M et al. : *Is group physical therapy superior to individualized therapy in ankylosing spondylitis ? A randomized controlled trial. Arthritis Care Res 1993; 6: 117-25. 8.*
- xxi. Hidding A, Van Der Linden S, Gielen X et al.: *Continuation of group physical therapy is necessary in ankylosing spondylitis: Results of a randomized controlled trial. Arthritis Care Res 1994; 7: 90-6. 9.*
- xxii. Kraag G, Stokes B, Groh J et al.: *The effects of comprehensive home physiotherapy and supervision on patients with ankylosing spondylitis—a randomized controlled trial. J Rheumatol 1990; 17: 228-33.*
- xxiii. Kraag G, Stokes B, Groh J et al.: *The effects of comprehensive home physiotherapy and supervision on patients with ankylosing spondylitis – an 8-month follow-up. J Rheumatol 1994; 21: 261-3*
- xxiv. Heeneman S, Daemen MJ. *Cardiovascular risks in spondyloarthritides. Curr Opin Rheumatol. 2007;19(4):358–362. doi: 10.1097/BOR.0b013e328133f58e.*
- xxv. Moll JM, Wright V. *Psoriatic arthritis. Semin Arthritis Rheum. 1973;3(1):55-78.*
- xxvi. Franssen, Van Herwaarden. *Lung function in patients with ankylosing spondylitis. A study of the influence of disease activity and treatment with nonsteroidal antiinflammatory drugs. November 1986, The Journal of Rheumatology 13(5):936-40*
- xxvii. Carter, Riantawan. *An investigation of factors limiting aerobic capacity in patients with ankylosing spondylitis. October 1999. Respiratory Medicine 93(10):700-8*
- xxviii. Helliwell, C. A. Abbott, and M. Chamberlain, “*A randomised trial of three different physiotherapy regimes in ankylosing spondylitis,*” *Physiotherapy*, vol. 82, no. 2, pp. 85–90, 1996.
- xxix. Van Tubergen, A. Boonen, R. Landewé et al., “*Cost effectiveness of combined spa-exercise therapy in ankylosing spondylitis: a randomized controlled trial,*” *Arthritis Care and Research*, vol. 47, no. 5, pp. 459–467, 2002.
- xxx. Uhrin, S. Kuzis, and M. M. Ward, “*Exercise and changes in health status in patients with ankylosing spondylitis,*” *Archives of Internal Medicine*, vol. 160, no. 19, pp. 2969–2975, 2000.
- xxxi. Zochling, D. van der Heijde, R. Burgos-Vargas et al., “*ASAS/EULAR recommendations for the management of ankylosing spondylitis,*” *Annals of the Rheumatic Diseases*, vol. 65, no. 4, pp. 442–452, 2006.