

Cardiac Involvement in Ankylosing Spondylitis

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Abstract

Background: Ankylosing spondylitis can lead to heart disease, including aortic incompetence, conduction defects, mitral valve disease, cardiomyopathy, and pericarditis. Early detection of cardiac abnormalities is crucial for effective treatment and prognosis, as they increase with age, disease duration, and peripheral arthritis presence. **Objectives:** This study aimed to determine the type, prevalence, and extent of cardiac involvement in patients diagnosed with ankylosing spondylitis. **Methods:** The study were collected in the Department of Medicine and Rheumatology units of Bangabandhu Sheikh Mujib Medical University and Dhaka Medical College Hospital from January 2022 to December 2022. Diagnosis was established based on clinical features, physical examinations, and relevant laboratory and imaging studies. Patients with a history of rheumatic fever, syphilis, or those who declined participation were excluded from the study. **Results:** A total of 80 patients with ankylosing spondylitis underwent clinical examination, electrocardiography, and echocardiography to assess cardiac involvement. Among the participants, eight patients (10%) were found to have aortic insufficiency. Two patients had both aortic insufficiency and first-degree heart block, one had only first-degree heart block, and one had mitral insufficiency. Presents the cardiovascular manifestations detected in 12 patients (14%) with ankylosing spondylitis. Peripheral arthritis was present in 64% of the 12 patients with cardiovascular lesions, compared to only 34% of the 68 patients without such lesions. **Conclusion:** This hospital-based observational study investigated cardiac involvement in ankylosing spondylitis patients. Due to the small sample size, definitive conclusions were difficult to make, but the findings suggest that cardiac involvement is relatively common, emphasizing the need for early detection of cardiac abnormalities for effective treatment and prognosis.

Keywords: Ankylosing Spondylitis, Heart Disease, Cardiomyopathy, Electrocardiography, Echocardiography.

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INTRODUCTION

Ankylosing spondylitis is a chronic inflammatory disorder that primarily affects the spine, sacroiliac, and peripheral joints. It is more prevalent in young males and can result in the fusion of spinal vertebrae. The presence of HLA-B27 is commonly observed in patients with ankylosing spondylitis and is believed to play a role in its pathophysiology. It has been estimated that cardiac manifestations in patients with ankylosing spondylitis are found in 2-10% of patients. It was initially in 1930s when aortitis was found in a group of patients with spondylitis. There is also risk of conduction defects, valvular regurgitation and cardiomyopathy associated with this entity [1]. This is especially important, given that in many patients,

cardiac changes may begin prior to the onset of clinical symptoms [2].

The presence of aortic root and valve disease in ankylosing spondylitis is related to the duration of the underlying disease. Aortic disease and aortic regurgitation may, however, predate the onset of any joint symptoms and the presence of ankylosing spondylitis as an underlying cause may not be initially appreciated. One of the first pathophysiologic descriptions of valvular disease in ankylosing spondylitis was put forward by Bulkley and Roberts, who studied autopsy findings in eight patients with ankylosing spondylitis. They noted aortic root dilatation and fibrous proliferation along with intima [3]. Further examination demonstrated a cellular inflammatory

process coupled with platelet aggregation leading to endarteritis around the aortic root and valve. This in turn stimulates fibroblast hyperactivity leading to tissue thickening involving aortic annulus, cusps, aortomitral junction along with the conduction system [4].

The thickening of the valvular cusps, dilatation of the aortic root, and abnormal cusp displacement via the thickened subaortic tissue all lead to aortic regurgitation. Except for the duration of ankylosing spondylitis, aortic root disease and valve disease were unrelated to the activity, severity or therapy of ankylosing spondylitis. Mitral regurgitation is less common. The proposed mechanism is basically a continuation of fibrosis of the subaortic tissues which can progress to reach the mitral valve leaflet. Thereby a stiffening and hence reduction of the mitral valvular mobility occurs, eventually leading to mitral regurgitation. Another potential mechanism for mitral regurgitation may be as a result of severe aortic regurgitation, leading to a hypertrophied left ventricle and hence a distortion of mitral valve apparatus.

Conduction abnormalities are amongst the most commonly observed cardiac manifestations of patients with ankylosing spondylitis that usually predate other cardiac manifestations such as valvular insufficiency [5]. In a study by Dik *et al.*, they found a statistically significant higher prevalence of patients with first-degree AV block as well as an association of these blocks with the duration of disease activity. There have been two prevalent theories about the etiology of conduction disturbances in patients with ankylosing spondylitis: inflammation in the interventricular septum leading to damage versus anomalies in the AV nodal artery leading to AV node dysfunction. Certainly, the above processes may play hand in hand, given that both AV blocks along with atrial and ventricular extrasystoles have been reported. Interestingly, in the observational study by Dik *et al.*, they also report an increased finding of conduction disturbances in patients who are HLA-B27 positive, even in patients without rheumatologic manifestations of ankylosing spondylitis [6].

Toussirot *et al.*, found factors which highlight autonomic nervous system derangements, in patients with ankylosing spondylitis [7]. Since most of the studies point towards early detection and treatment of rheumatologic cardiac manifestations, then early testing of these patients becomes important. There are multiple modalities listed in the literature to aid in the evaluation of cardiac manifestations such as utilization of ECG, 24-hour holter monitoring and echocardiography. Yildirim *et al.*, demonstrated that calculation of the QT dispersion on a standard ECG is cheap, quick and reveals valuable information regarding patient susceptibility to arrhythmias. [8]

It is widely demonstrated that the myocardial dysfunction evident in patients with ankylosing spondylitis is that of the diastolic variety, as opposed to systolic. For example, in a study by Yildirim *et al.*, they found significant diastolic dysfunction in ankylosing spondylitis patients, particularly an abnormal relaxation pattern [2]. This was demonstrated via echocardiography, by the statistically significant lower E-wave velocity (early diastolic filling), higher A-wave velocity (late diastolic filling), and overall low E/A ratio, which becomes evident in patients with diastolic dysfunction. Similarly, Gould *et al.*, evaluated the peak filling throughout exercise, along with the time to achieve peak filling during strenuous activity via radionucleotide angiography [9].

Both of these measures were considerably decreased in the patients with ankylosing spondylitis versus the normal volunteers. Hence, these findings also support an overall decrease in compliance, and thus a reduction in diastolic function. Coronary flow reserve (CFR) is a measurement, which evaluates the function of the coronaries in terms of their microvascular circulation. This measure has been touted by some experts as an important tool, holding prognostic significance in the evolution of atherosclerosis in patients. Caliskan *et al.*, recently used transthoracic Doppler echocardiography (TTDE) to determine the CFR in ankylosing spondylitis patients. Their findings were consistent with a significant decrease in CFR in ankylosing spondylitis patients. Interestingly, the levels of CRP and TNF-alpha correlated with the decline in CFR in these patients. Another study looked at an actual outcome, being myocardial infarction, in patients with ankylosing spondylitis. They found a 2-3-fold increase in the rate of infarctions in the ankylosing spondylitis population which they studied. Of note, amongst patients with and without a myocardial infarct history, there was no difference in the use and type of antirheumatic therapy [10].

There has been research demonstrating that markers of inflammation (i.e. CRP, IL-6) can reach a high enough level to start disturbing lipid metabolism and diminishing insulin activity, hence causing insulin resistance and dyslipidemia, leading to increased overall trend for atherogenicity. In a study by Divecha *et al.*, they found a significant elevation in IL-6 and CRP levels in patients with ankylosing spondylitis over that of healthy subjects. This is significant, as it has been reported that even a sub clinical but chronic elevation in the levels of these markers accelerate risk of coronary heart disease in patients without autoimmune illnesses [11].

MATERIALS AND METHODS

A total of 80 cases of ankylosing spondylitis were included Patients attending outpatient department and patients getting admission in indoor of Medicine and Rheumatology units of Bangabandhu Sheikh Mujib

Medical University and Dhaka Medical College Hospital from January 2022 to December 2022. Over the study period and diagnosed as having ankylosing spondylitis were selected for the study. Diagnosis was established by clinical feature, physical examination and subsequent laboratory and imaging studies. It was a cross sectional study

Inclusion Criteria:

- Patients who were diagnosed as having ankylosing spondylitis.

Exclusion Criteria:

- Patients were excluded from the study if they had antecedent history of
- Rheumatic fever, syphilis or unwilling to take part in the study.

DATA COLLECTION

An informed written consent was obtained from each patient or attendant of the patient having above mentioned criteria. Each patient or attendant was

interviewed. Their particulars, detailed history, physical and laboratory findings were recorded in a data sheet.

Data Analysis

After collection of data, it was coded and checked manually and then entered into computer. Data analysis was done according to the objectives of the study by using SPSS-12.0 (Statistical Program for Social Science) software program. The result of the clinical study and statistical analysis is presented in the form of text, table, bar and chart.

RESULTS

A total of 80 cases of ankylosing spondylitis were included in the present study All were analyzed and presented in graph and tabulated form Through 6 months, 80 patients had been included in this study. The mean age of patients in our study was 29.68 10.53 (mean SD) years with a range of 12 to 58 years. The maximum number of patients (N=30, 38%) belonged to the age group of 21-30 years.

Table 1: Age and Gender distribution of the studied

Age	Number of patients	Percentage (%)
11-20	20	24
21-30	30	38
31-40	20	24
41-50	6	8
51-60	4	6
Sex		
Male	76	94
Female	4	6

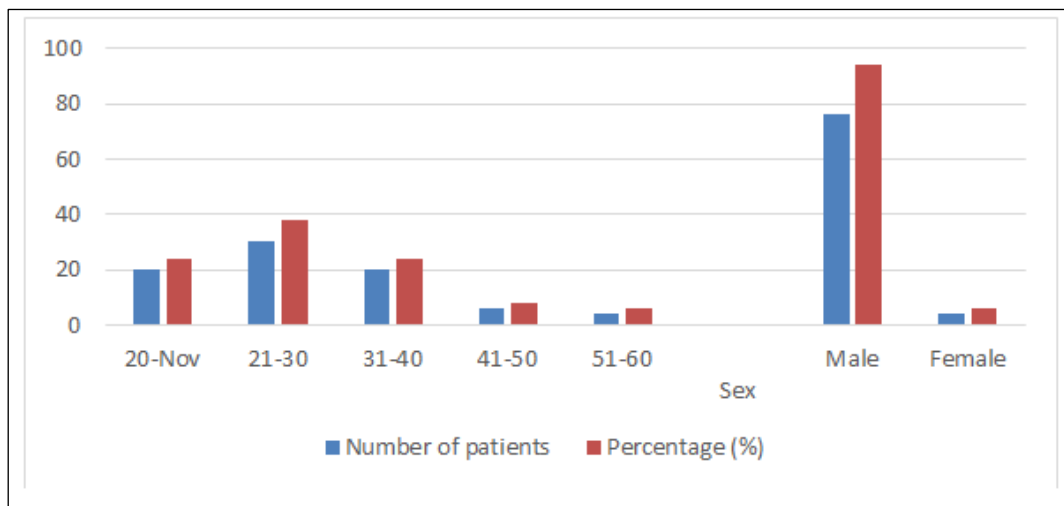


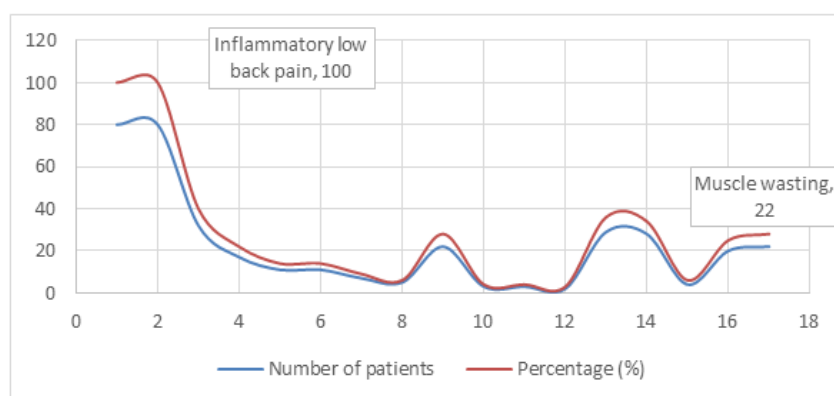
Figure 1: Demographic background of the participants in the study

The age distribution (table 1) of patients at the time of data collection were as follows; 20 patients (24%) from 11 to 20 years, 30 patients (38%) from 21 to 30 years, 20 patients (24%) from 31 to 40 years, 6

patients (8%) from 41 to 50 years, 4 patients (6%) from 51 to 60 years, The gender distribution were 76 (94%) males and 4 (6%) females (male: female ratio= 19:1).

Table 2: Common clinical presentations of ankylosing spondylitis in tertiary care hospital

Clinical features	Number of patients	Percentage (%)
Inflammatory low back pain	80	100
Restricted movement of spine	80	100
Peripheral joint involvement	32	40
Pain in sole/achilis tendon	17	22
Chest pain	11	14
Palpitation	11	14
Breathlessness	7	9
Anaemia	5	6
Deformities	22	28
Tachycardia	3	4
Bradycardia	3	4
Fever	2	3
Limited range of movement	29	36
Positive Schober's test	28	34
Restricted chest expansibility	4	6
Sacroiliac joint tenderness on compression	20	25
Muscle wasting	22	28

**Figure 2: Ankylosing spondylitis' characteristic clinical manifestations in hospitals**

The main presenting symptoms were inflammatory low back pain (100%, 80/80), restricted movement of spine (100%, 80/80), peripheral joint involvement (40%, 32/80), pain in sole/achilis tendon (22%, 17/80), chest pain (14%, 11/80), palpitation (14%, 11/80), breathlessness (9%, 07/80). The clinical examination revealed anaemia in 5 (6%) patients,

deformities in 22 (28%) patients, tachycardia in 3 (4%) patients, bradycardia in 3 (4%) patients, fever in 2 (3%) patients, limited range of movement in 29 (36%) patients, positive Schober's test in 28 (34%) patients, restricted chest expansibility in 4 (6%) patients, sacroiliac joint tenderness on compression in 20 (25%) patients, muscles wasting in 22 (28%) patients.

Table 3: Clinical characteristics of patients with ankylosing spondylitis associated heart disease.

Patient	Age*	Duration of AS*	Cardiovascular lesion
Sumon Sikder	26	11	A1
Shahidullah	20	9	A1
Sirajul Islam	42	14	A1
Abdur Rahman	35	14	A1
Habib Ullah	28	12	A1
Anwar Hossain	37	19	A1
Jahangir Hossain	29	12	A1
Baniz Khan	29	13	A1
Atiar Rahman Sikder	42	16	A1+HB
Jahidul Islam	25	11	A1+HB
Tajul Islam	27	7	HB
Abdur Razzak	26	11	MI

*All values in years., A1 = aortic insufficiency, MI = mitral insufficiency, HB = heart block

Among the 80 patients 8 (10%) had aortic insufficiency, 2 (2%) had both aortic insufficiency and first-degree heart block, 1 (1%) had only first-degree heart block, 1 (1%) had mitral insufficiency. Prevalence of cardiac involvement increases with the duration of ankylosing spondylitis. Peripheral arthritis was significantly more among the patients with cardiovascular involvement (64%) than the patients with unaffected heart (34%). We did not find any evidence of mitral valve prolapse, cardiomyopathy, left ventricular dysfunction, pericarditis, ischemic heart disease among this study population.

DISCUSSION

The findings of this study provide valuable insights into the cardiac involvement in patients with ankylosing spondylitis (AS). The prevalence of cardiac abnormalities in this cohort highlights the importance of considering cardiac evaluations in individuals with AS, particularly in those with peripheral arthritis [12]. The identification of such abnormalities is crucial for early detection, appropriate management, and improved prognosis.

This cross-sectional study was undertaken to observe the pattern of cardiac involvement in patients with ankylosing spondylitis. Among the 80 patients 8 (10%) had aortic insufficiency, 2 (2%) had both aortic insufficiency and first-degree heart block. 1 (1%) had only first-degree heart block, 1 (1%) had mitral insufficiency. Prevalence of cardiac involvement increases with the duration of ankylosing spondylitis. Peripheral arthritis was significantly more among the patients with cardiovascular involvement (64%) than the patients with unaffected heart (34%). Although the association of ankylosing spondylitis with valvular disease has been well documented in contemporary medical literature there exist discrepancies with respect to the frequency of this association. Not surprisingly, greater awareness of the association has resulted in a progressively increasing reported incidence of ankylosing spondylitis associated AI [13].

A recent report has re-emphasized the occurrence of mitral valve involvement in the form of mitral insufficiency in AS and we found only one case of mitral insufficiency. As our sample size was small, it may not represent the actual scenario [14]. Moreover, in these hospitals we get much advanced and refractory cases of ankylosing spondylitis. So, the incidence of cardiac involvement might be higher among these patients who do not include the early cases of ankylosing spondylosis. We could not use transesophageal echocardiography which might be more sensitive. Some recent studies showed abnormalities in P wave in patients with ankylosing spondylitis, yet we could not assess this also. Larger study preferably case-control study in comparison to normal control should be done for identifying more

association of cardiac diseases with ankylosing spondylitis.

Interestingly, the association between peripheral arthritis and cardiac involvement observed in this study suggests a possible link between joint inflammation and cardiac pathology in AS. This association has been proposed previously, with studies demonstrating a higher frequency of cardiac abnormalities in AS patients with peripheral arthritis compared to those without [15]. The exact underlying mechanisms for this association remain unclear, but it is hypothesized that systemic inflammation and immune dysregulation may contribute to the development of both joint and cardiac manifestations in AS [16].

Despite the valuable insights provided by this study, several limitations should be acknowledged. The small sample size restricts the generalizability of the findings to a broader AS population [17]. Furthermore, the study's cross-sectional design limits the ability to establish causal relationships between AS and cardiac abnormalities. Future prospective studies with larger cohorts are warranted to confirm and further investigate the relationship between AS and cardiac involvement.

CONCLUSION

In study, this hospital-based observational study demonstrates that cardiac involvement is relatively common in patients with AS. The findings emphasize the importance of early detection and regular cardiac evaluations in individuals with AS, particularly those with peripheral arthritis. By identifying cardiac abnormalities promptly, clinicians can implement appropriate management strategies to optimize treatment and improve patient outcomes.

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