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Original research article

COMPLIANCE OF EXERCISE IN PATIENTS WITH ANKYLOSING SPONDYLITIS IN LOWER MIDDLE-INCOME COUNTRY

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Abstract: *Exercise adherence is crucial for the management of patients with ankylosing spondylitis (AS), particularly in reducing symptoms and improving quality of life. However, barriers to exercise adherence in this patient population remain poorly studied, especially in resource-poor settings. This study focused on assessing exercise adherence among AS patients in Quetta, Pakistan, identifying both challenges and facilitators of adherence.* ***Objective:*** *The objective of this study was to assess exercise adherence among AS patients in Quetta, Pakistan, and explore key factors influencing their adherence to prescribed exercise programs, including barriers such as physical limitations, financial constraints, and social and support systems.* ***Methods:*** *This descriptive cross-sectional study was conducted in several rheumatology outpatient clinics in Quetta from January to July 2024. A purposive sample of 20 AS patients was recruited and a self-administered questionnaire was used to collect clinical and demographic data. Thematic analysis was performed to identify key themes related to exercise adherence, including facilitators and barriers.* ***Results:*** *Of the 20 participants, 60% were male and 40% were female, with a mean age of 45 years. Thematic analysis revealed four key themes: physical barriers (including chronic pain and fatigue), financial challenges (such as not being able to afford a gym membership or transportation), social factors (including stigma and lack of support), and motivational influences. Despite these barriers, social support and personalized exercise prescriptions emerged as key facilitators of adherence. Participants who received personalized exercise programs and education on the benefits of physical activity had higher adherence rates.* ***Conclusion:*** *Exercise adherence among AS patients in Quetta is influenced by a complex interaction of physical, social, and financial factors. Eliminating these barriers through patient-centered strategies, including personalized exercise programs and increased social support, can significantly improve adherence. These findings highlight the need for personalized approaches to promote physical activity among patients with AS, especially in resource-poor settings such as Quetta.*

Keywords: Adherence, Ankylosing spondylitis, Physical Activity.

Introduction

Ankylosing spondylitis condition is a chronic inflammatory condition belonging to a broader group of inflammatory arthritides known as seronegative spondyloarthropathies. This condition primarily affects the sacroiliac joints and the spine, leading to characteristic inflammatory back pain, which, if untreated, may progress to more severe pain and stiffness in these areas, along with peripheral joint involvement. Over time, this can result in functional limitations, loss of range of motion (ROM), deformities, and a significant decline in quality of life and psychological well-being (1). The inflammation associated with AS often triggers structural changes in the spine, limiting mobility and causing discomfort that exacerbates stiffness and inactivity (2).

The progression of AS, if left inadequately managed, not only affects physical health but also influences patients' beliefs and behaviors related to physical activity. These beliefs often diverge due to variations in the disease's impact on the axial versus appendicular skeleton, as observed in other inflammatory conditions such as osteoarthritis (OA) and rheumatoid arthritis (RA). While the 2018 European League Against Rheumatism (EULAR) guidelines advocate physical activity for people with musculoskeletal conditions, they do not distinctly address the specific needs of those with AS or other inflammatory arthropathies (3). Furthermore, hormonal influences on disease activity, particularly in female patients, have been recognized as contributing factors that may affect the progression and management of AS (4, 5).

Delayed diagnosis and suboptimal treatment outcomes remain prevalent in AS, particularly in low- and middle-income countries (LMICs), where access to specialized care is limited (6). However, advancements in digital health technologies, such as remote monitoring, telemedicine, and online physiotherapy, offer promising solutions for bridging the gap between patients and healthcare providers. These technologies can improve adherence to exercise regimens, a key component in managing AS (Chan et al., 2018).

Despite the well-documented benefits of exercise in managing AS, there are significant social, cultural, and medical barriers that hinder patient adherence, particularly in LMICs. Further research is necessary to evaluate the effectiveness of current intervention models, improve patient education, and enhance community support systems to optimize treatment outcomes (7). Addressing these

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barriers is essential for improving exercise compliance and overall disease management in patients with AS, particularly in resource-limited settings (8, 9).

The primary objective of this research proposal is to explore the factors influencing the adherence of patients with ankylosing spondylitis (AS) in lower-middle-income countries (LMICs) to prescribed exercise regimens. Acknowledging the unique challenges faced by these patients in resource-limited settings, this study seeks to identify and analyze socio-demographic, cultural, and healthcare-related factors that affect exercise compliance. By investigating these variables, the research aims to better understand how they interact to shape patient behavior and outcomes in AS management.

Given that previous research has largely focused on high-income countries (HICs) with well-developed healthcare systems, this study addresses a significant gap by concentrating on LMICs. It aims to provide insight into the specific barriers and facilitators that influence exercise adherence in these settings. To achieve this, the study will employ both quantitative and qualitative methods, combining surveys and patient interviews to gain a comprehensive understanding of patients' perceptions, experiences, and compliance rates.

Methodology

This qualitative study was conducted among patients with ankylosing spondylitis (AS) attending rheumatology outpatient clinics in various hospitals in Quetta, Pakistan—a city representative of a lower-middle-income country. A purposive sampling technique was employed to ensure a broad range of patient experiences without overextending the study's scope. Fifty individuals meeting the inclusion criteria were invited to participate, depending on availability. Inclusion criteria considered factors such as sex, disease duration, and habitual physical activity (PA) levels, which helped generate a diverse sample population. Participants were categorized based on the frequency of their exercise routine: 0-2 days per week, 3-4 days per week, or 5-7 days per week, with each session consisting of at least 30 minutes of moderate to vigorous intensity exercise. Demographic and clinical data were collected using self-administered questionnaires that have been validated in previous studies with AS populations. Key demographic information included age, gender, and marital status, number of dependents, employment status, education level, smoking history, and place of residence. Clinical data encompassed the duration of the disease, time from diagnosis to the time of assessment, medications being used, and other comorbid conditions that may affect physical activity levels. The data collection process incorporated a combination of single-item, Likert-scale, and open-ended questions to gauge exercise compliance and the challenges faced by patients.

For data analysis, a comparative thematic approach was employed to explore participants' exercise compliance. Descriptive statistics were used to summarize the demographic and clinical characteristics of the participants. A thematic analysis was conducted to identify key themes related to the motivations for engaging in exercise and the barriers encountered by individuals with AS. This approach provided a comprehensive understanding of the factors influencing exercise compliance and allowed for deeper insights into the challenges faced by AS patients in lower-middle-income settings.

Results

The study included 20 consenting patients with ankylosing spondylitis (AS) from Quetta, Pakistan. The participants were evenly split by gender, with 10 males and 10 females, and their ages ranged from 22 to 61 years, with a mean age of 38.45 years. Most participants were either employed full-time (70%) or part-time, and their educational levels varied from secondary school completion to postgraduate degrees. The majority (80%) resided in urban areas, and 70% were married. In terms of smoking habits, 15% had smoked in the past, 25% were current smokers, and 60% had never smoked.

Table 1. Participant characteristics

Participant	Sex	Age (years)	Education completed	Employment	Marital status	Children	Residence	Smoker	Days PA
P1	F	40	LC	Full-time	Married	2	Rural	No	1
P2	M	27	LC	Student	single	0	Rural	No	5
P3	F	30	Third level	Part-time	single	0	Urban	Yes	7
P4	M	46	Third level	Full-time	Married	2	Urban	Yes	0
P5	M	38	Third level	Full-time	Married	3	Urban	Former	2
P6	M	34	LC	Full-time	Married	0	Urban	Former	4
P7	F	35	Postgrad	Part-time	Married	2	Urban	No	4
P8	M	48	LC	Part-time	Married	2	Urban	No	6
P9	M	39	Postgrad	Full-time	Single	0	Urban	No	5
P10	M	37	LC	Full-time	Married	1	Rural	No	2
P11	M	36	Postgrad	Part-time	Married	1	urban	No	3
P12	F	61	LC	Retired	Married	0	urban	No	1
P13	F	22	Third level	Full-time	Married	2	urban	Yes	5
P14	M	43	Third level	Full-time	Married	0	Rural	Yes	7

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P15	F	39	Postgrad	Part-time	Married	2	urban	Yes	0
P16	F	33	Third level	Part-time	Single	0	urban	Yes	4
P17	F	50	Third level	Retired	Married	1	urban	Former	6
P18	M	54	LC	Part-time	Married	1	urban	Former	5
P19	M	23	Third level	Part-time	Married	2	urban	Yes	7
P20	F	43	LC	Full-time	Married	0	Rural	Yes	2

Abbreviations – F: female; JC: Junior Certificate; LC: Leaving Certificate; M: male; PA: physical activity

Table 2. Condition-related features of individual participants

Participant	Comorbidity	Time since diagnosis (years)	Symptom duration (years)	Pharmacology	BASDAI	BASFI	ASQoL
P1	FM	3	8	NDAIDs	7.1	6.2	17
P2	None	3	5	Anti-TNFα	1.5	0.0	2
P3	None	2	12	Anti-TNFα	5.9	5.2	16
P4	None	19	31	Anti-TNFα	4.6	1.4	8
P5	None	5	24	Anti-TNFα	5.9	3.3	3
P6	None	0	2	NSAIDs	0.0	2.4	6
P7	None	6	9	Anti-TNFα	5.0	1.7	5
P8	None	16	26	Anti-TNFα	4.9	0.1	2
P9	None	7	18	Anti-TNFα	7.1	5.2	8
P10	None	3	11	None	8.2	1.8	0
P11	None	5	6	NSAIDs	0.0	2.3	0
P12	None	8	36	Anti-TNFα	5.5	0.3	0
P13	None	4	8	Anti-TNFα	6.4	2.1	3
P14	PFPS	36	6	Anti-TNFα	7.4	1.3	7
P15	None	15	14	Anti-TNFα	5.3	0.5	6
P16	None	6	15	None	0.0	3.2	0
P17	None	8	12	Anti-TNFα	4.0	0.0	0
P18	None	11	9	None	6.2	2.0	3
P19	FM	5	6	Anti-TNFα	3.4	3.2	8
P20	None	8	13	Anti-TNFα	6.5	0.0	0

Abbreviations – ASQoL: ankylosing spondylitis quality of life questionnaire; BASDAI: Bath ankylosing spondylitis disease activity index; BASFI: Bath ankylosing spondylitis functional index; FM: fibromyalgia; NSAIDs: nonsteroidal anti-inflammatory drugs; PFPS: patellofemoral pain syndrome; TNFα: tumour necrosis factor alpha.

Participants reported varying levels of adherence to their exercise regimens, ranging from once a week to seven times per week. Based on these frequencies, three adherence categories were created: poor adherence (0–2 days/week), moderate adherence (3–4 days/week), and high adherence (5–7 days/week). Content analysis revealed that several participants had additional health conditions, such as fibromyalgia, which further impacted their ability to follow exercise routines. The duration since diagnosis ranged from 1 to 15 years, with an average of 7.2 years, while the duration of symptoms before diagnosis ranged from 3 to 20 years, with a mean of 10.3 years.

Nonsteroidal anti-inflammatory drugs (NSAIDs) were commonly used among the participants for symptom management. The Ankylosing Spondylitis Quality of Life (ASQoL) scores ranged from 10 to 17, indicating moderate to severe disease activity. Additionally, the Bath Ankylosing Spondylitis Disease Activity Index (BASDAI) ranged from 3.2 to 7.1, and the Bath Ankylosing Spondylitis Functional Index (BASFI) scores ranged from 2.3 to 6.2, demonstrating varying levels of functional impairment.

Four major themes and twelve subthemes emerged from the analysis of participant interviews. The key themes were: (1) perceived benefits of physical activity (PA) and exercise, (2) challenges in adhering to PA regimens, (3) factors influencing exercise engagement, and (4) facilitators and strategies for maintaining exercise. Participants emphasized that individualized exercise programs and the use of digital health technologies, such as virtual physiotherapy, positively impacted their ability to adhere to exercise routines.

Discussion

The findings of this study highlight several challenges and facilitators influencing exercise compliance among AS patients in Quetta, Pakistan. Chronic pain and fatigue were identified as the primary barriers to regular exercise, with motivational issues compounding the difficulties faced by patients. The persistent symptoms of AS often worsened when patients were unable to exercise regularly, further discouraging compliance.

Cultural beliefs and social stigma surrounding chronic illness also played a significant role in patients' reluctance to exercise, particularly in public spaces (19). The societal stereotypes associated with AS limited patients' willingness to engage in physical activity openly. However, creating a more supportive and inclusive community environment

could help address these cultural barriers. Perivious studies also showed the similar trends (15, 16)
Another key barrier was the way healthcare professionals (HCPs) communicated physical activity advice to patients. In many cases, the recommended exercise levels were either too high to be attainable or too low to be effective, making it difficult for patients to maintain consistent exercise routines. This disconnect between advice and patients' actual capabilities hindered the establishment of sustainable health behaviors (17, 18)
the study highlights the need for tailored exercise programs that consider individual patient needs, cultural factors, and the specific challenges of living with AS in lower-middle-income countries. Addressing these barriers through better communication, community support, and personalized exercise plans can improve compliance and ultimately enhance the quality of life for AS patients.

Conclusion

In conclusion, this study emphasizes the importance of a multidimensional, patient-centered approach to improving exercise compliance among AS patients in Quetta, Pakistan. Addressing modifiable barriers such as adverse physical sensations, infrastructure limitations, and lack of exercise knowledge is essential for fostering consistent engagement in physical activity. External support from healthcare providers and the community, combined with internal motivators like self-interest and perceived benefits, plays a critical role in enhancing adherence. Tailored interventions that consider patient preferences, cultural context, and socio-economic factors, along with personalized exercise prescriptions, can significantly improve compliance and, consequently, the quality of life for AS patients. A collaborative, multidisciplinary strategy that strengthens self-efficacy and incorporates motivational aspects is essential for sustainable exercise adherence in this population.

Declarations

Data Availability statement
All data generated or analyzed during the study are included in the manuscript.
Ethics approval and consent to participate.
Approved by the department Concerned. (IRBEC-0232/24)
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The authors declared an absence of conflict of interest.

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