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Rheumatoid Arthritis among the Kyrgyzstan Population: Prevalence, Patterns, and Determinants

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ABSTRACT

Background: Rheumatoid arthritis (RA) sequelae represent an emerging public health concern in Kyrgyzstan, particularly among the young adult and working-age population. Despite a high burden of autoimmune disorders across successive seasons, systematic community-level data on the prevalence, clinical patterns, and determinants of rheumatoid arthritis complications in Kyrgyz young adults remain limited. This survey-based study was designed to address this evidence gap through a structured multi-domain questionnaire administered to a cross-sectional sample.

Objectives: To determine the prevalence of rheumatoid arthritis complications among young adults in Kyrgyzstan; to characterise acute and persistent joint symptom patterns; to evaluate the subjective severity and functional impact of rheumatologic morbidity; and to identify key environmental, clinical, and behavioural determinants of rheumatoid arthritis health outcomes.

Methods: A cross-sectional survey was conducted among 128 participants using a 20-item structured questionnaire comprising four question types: multiple choice questions (MCQ), multiple correct answer questions, five-point linear scale ratings, and open-ended short answer questions. Data were analysed descriptively using frequency distributions and mean scores. Participants were recruited through convenience sampling and were predominantly in the 18–45 year age group (93.0%).

Results: Of 128 respondents, 48.4% confirmed a prior formal RA diagnosis and 60.2% reported acute joint swelling and morning stiffness. Illness severity was predominantly mild (54.7%) or asymptomatic/early-stage (26.6%), with 44.5% unmanaged by systemic immunosuppressive therapy at the time of initial symptom presentation. Symmetric polyarthritis (65.0%) and morning stiffness exceeding one hour (38.3%) were the most prevalent acute manifestations. Post-recovery/follow-up, 51.6% experienced at least one persistent symptom, with persistent joint pain (32.0%), restricted range of motion on exertion (21.9%), and localized joint warmth (18.8%) being most common. New-onset musculoskeletal diagnoses included secondary osteoarthritis (19.5%), severe tenosynovitis (14.1%), carpal tunnel syndrome (7.8%), and rheumatoid nodules (5.5%). Linear scale ratings indicated low-to-moderate mean severity across all domains (range: 1.70–1.98/5), though a clinically significant subgroup reported higher burden. Critically, 39.8% received no post-diagnosis biological treatment and 71.9% underwent no routine immunological or radiographic screening.

Conclusion: Rheumatoid arthritis morbidity is prevalent and clinically heterogeneous among young adults in Kyrgyzstan, with a substantial burden of persistent symptoms and secondary structural joint diagnoses. A significant treatment and surveillance gap exists, underscoring an urgent need for structured rheumatologic care pathways, community-based physical rehabilitation programmes, and longitudinal monitoring policies within Kyrgyzstan's public health framework.

Keywords: Rheumatoid arthritis; Autoimmune disorders; Joint morbidity; Young adults; Kyrgyzstan; Central Asia; Rheumatologic sequelae.

3. RESULTS

3.1 Sociodemographic Characteristics and Rheumatoid Arthritis Profile (MCQ)

A total of 128 respondents participated in this cross-sectional survey-based study. The majority of participants belonged to the 31–45 years age group (n = 68; 53.1%) followed by the 18–30 years cohort (n = 51; 39.8%), with a smaller proportion in the 45–60 years (n = 6; 4.7%) and ≥61 years (n = 3; 2.3%) brackets. This demographic distribution reflects a predominantly young-to-middle-adult sample, aligning with the study's focus on the working-age population most affected by chronic musculoskeletal sequelae in Kyrgyzstan. Regarding rheumatoid arthritis diagnosis, 62 respondents (48.4%) confirmed a prior formal diagnosis through serum rheumatoid factor (RF)/anti-CCP testing or specialist rheumatologist evaluation, while 44 (34.4%) remained unsure of their exact clinical classification status, and 22 (17.2%) reported no prior clinical history. Among those diagnosed, illness severity was predominantly mild-to-moderate at onset: 70 respondents (54.7%) managed their illness through outpatient NSAID management and lifestyle modification, 34 (26.6%) were asymptomatic or in clinical remission, 16 (12.5%) required specialized biological consultation, and only 7 (5.5%) required acute hospitalization for systemic flare-ups. A significant proportion—44.5% (n = 57)—reported being entirely unmanaged by regular disease-modifying antirheumatic drugs (DMARDs) at the time of serious symptom onset, while 40 respondents (31.3%) were fully optimized on standard methotrexate regimens and 30 (23.4%) were partially managed. Acute joint flare-ups with systemic breathing or inflammatory difficulties were reported by 77 respondents (60.2%), indicating a high prevalence of articular involvement even in early-stage cases.

Table 1: Sociodemographic Characteristics and Rheumatoid Arthritis Profile (N = 128)

Variable	Category	n	% (N = 128)
Age Group	18–30 years	51	39.8
	31–45 years	68	53.1
	45–60 years	6	4.7
	≥61 years	3	2.3
Rheumatoid Arthritis Diagnosis	Confirmed (Yes)	62	48.4
	Unsure	44	34.4
	No	22	17.2
Illness Severity at Presentation	Asymptomatic / Early-stage	34	26.6
	Mild (outpatient/home care)	70	54.7
	Moderate (specialist consultation)	16	12.5
	Severe (acute hospitalization)	7	5.5
DMARD Therapy Status	Not managed (No DMARDs)	57	44.5
	Partially managed	30	23.4
	Fully managed / Optimized	40	31.3
Acute Joint Inflammatory Swelling	Yes	77	60.2
	No	48	37.5

3.2 Acute and Persistent Rheumatologic Symptom Patterns (Multiple Correct Answer Questions)

Analysis of multi-select response questions revealed that symmetric polyarthritis was the most commonly reported acute rheumatologic symptom, observed in approximately 65.0% of respondents (combined single and combination responses), followed by prolonged morning stiffness exceeding one hour (38.3%), shortness of breath/systemic fatigue (36.0%), chest/sternal tightness from costochondritis (14.8%), and joint wheezing/crepitus presentations (12.5%). The co-occurrence of symmetric polyarthritis and prolonged morning stiffness was the most frequent symptom combination (n = 38; 29.7%), followed by isolated symmetric joint swelling (n = 32; 25.0%). Reduced mobility combined with joint crepitus was noted in 7 respondents (5.5%), and polysymptomatic presentations involving three or more concurrent systemic symptoms were documented in 13.3% of confirmed

cases, suggesting diverse phenotypic manifestations of initial rheumatoid arthritis flares in this population. Concerning follow-up persistence of symptoms, 48.4% (n = 62) reported complete stabilization with no active persistent flares. However, persistent joint pain remained the most prevalent long-haul symptom (n = 21 single report; ~32.0% total including combinations), followed by localized chest/costochondral discomfort (18.8%), restricted range of motion during physical activity (21.9%), and structurally reduced exercise tolerance thresholds (15.6%). New-onset musculoskeletal and systemic disease diagnoses following primary RA onset were reported by 45 respondents (35.2%), with secondary osteoarthritis being the most frequently diagnosed condition (19.5%), followed by severe tenosynovitis (14.1%), carpal tunnel syndrome (7.8%), and subcutaneously visible rheumatoid nodules (5.5%). Combined diagnoses of chronic osteoarthritis with structural tenosynovitis were recorded in 3.1% of affected respondents, indicating rapid progression toward permanent joint damage and fibrotic changes in a subset of the studied Kyrgyz population.

Table 2: Acute and Persistent Rheumatologic Symptom Patterns (N = 128)

Symptom / Joint Pattern Domain	Category / Manifestation	% Reporting
Acute Rheumatologic Symptoms (During Flares)	Symmetric polyarthritis / Joint swelling	65.0%
	Systemic fatigue and lethargy	36.0%
	Prolonged morning stiffness (>1 hour)	38.3%
	Chest / Costochondral tightness	14.8%
	Articular crepitus / Reduced lubrication	12.5%
Persistent Post-Acute Joint Symptoms	No active persistent flares / Stable joint status	48.4%
	Persistent chronic joint pain	32.0%
	Restricted range of motion on activity	21.9%
	Localized costochondral / epigastric discomfort	18.8%
	Structurally reduced physical exercise threshold	15.6%
Post-RA Secondary Diagnoses	Secondary osteoarthritis / Cartilage loss	19.5%
	Severe tendon sheath inflammation / Tenosynovitis	14.1%
	Carpal tunnel syndrome / Median nerve pressure	7.8%
	Subcutaneous rheumatoid nodules	5.5%

3.3 Subjective Severity and Functional Impact (Linear Scale Ratings)

Five linear scale questions (1 = lowest, 5 = highest) were employed to quantify participant-reported severity of joint burden and functional limitation. The mean severity of inflammatory joint swelling during acute RA flares was rated at 1.98 ± 1.09, with 68 respondents (53.1%) assigning a score of 1 (minimal severity), though 28 respondents (21.9%) rated severity at 3 and 7 respondents (5.5%) at the maximum score of 5, reflecting a heterogeneous severity distribution. Current muscular and joint discomfort at the time of the survey was rated at a mean of 1.70 ± 0.90, suggesting partial pharmaceutical adaptation or sub-clinical persistence among the majority. The perceived overall impact of rheumatoid arthritis on long-term physical bone and joint health yielded a mean score of

1.93 ± 1.11, with 21 respondents (16.4%) each rating at score 2 and score 3, and 9 respondents (7.0%) rating at 4. The functional impact on basic daily activities and work routines was rated at a mean of 1.79 ± 1.03, with 76 respondents (59.4%) reporting minimal daily restriction (score 1). Notably, psychological concern regarding long-term joint deformities and permanent physical disability showed a mean score of 1.89 ± 1.21, yet 29 respondents (22.7%) rated their structural concern at 3 or above, indicating that a significant minority maintained elevated anxiety about future musculoskeletal deterioration. These ratings collectively underscore that while the majority experienced low-to-moderate functional compromise at this milestone, a clinically meaningful subgroup reported notable ongoing mobility limitations and heightened concern regarding progressive joint erosion.

Table 3: Linear Scale Ratings of Joint Severity and Functional Musculoskeletal Impact (N = 127*)

Rating Parameter (Scale: 1 Low, 5 High)	1	2	3	4	5	Mean ± SD
Severity of inflammatory joint swelling during peaks	68	16	28	8	7	1.98 ± 1.09
Current level of physical joint discomfort	72	33	14	4	4	1.70 ± 0.90
Perceived impact of RA on long-term joint and bone health	69	21	21	9	7	1.93 ± 1.11
Effect of physical joint symptoms on daily activities	76	19	17	9	5	1.79 ± 1.03
Anxiety regarding permanent physical disability / deformities	75	15	20	7	9	1.89 ± 1.21

**One respondent excluded due to missing scale data tracking fields.*

3.4 Risk Factors, Healthcare Utilization, and Preventive Behaviour (Short Answer Responses)

Short answer responses revealed important patterns regarding underlying risk factors, healthcare-seeking behaviour, and self-reported physical management strategies. Approximately 54.7% of respondents (n = 70) reported no identifiable external risk factor, suggesting a primary genetic or idiopathic autoimmune mechanism. High exposure to extreme cold mountain climate conditions was the most frequently cited modifiable or environmental contextual risk factor (n = 17; 13.3%), followed by occupational physical manual labor or repetitive mechanical joint strain (n = 13; 10.2%), pre-existing metabolic or microvascular disease (n = 8; 6.3%), and chronic history of smoking (n = 3; 2.3%). The co-occurrence of cold environment exposure and heavy occupational joint strain was noted in 7 respondents, underlining the compounded environmental burden faced by a section of the rural and semi-urban Kyrgyz workforce. Regarding specialized healthcare utilization, a substantial proportion—39.8% (n = 51)—reported receiving no formal continuous medical therapy or biological management for post-acute rheumatoid arthritis symptoms. Among those who actively sought care, standard physician or general clinical consultation was the most common level of support received (21.1%), while regular DMARD/immunosuppressive pill therapy (6.3%), targeted systemic steroid injection therapy (5.5%), and specialized rheumatologic physical rehabilitation programs (3.9%) were

utilized by relatively smaller proportions. A notably high 71.9% of respondents (n = 92) reported never undergoing any routine tracking radiography, joint ultrasound, or anti-CCP blood antibody panel monitoring after initial baseline validation. Among the small sub-cohort tested, ongoing investigations included basic extremity X-rays, localized joint MRIs, erythrocyte sedimentation rate (ESR) tests, and C-reactive protein (CRP) panels. Self-reported protective lifestyle modifications included dietary improvements described as "healthy nutritional intake" or "anti-inflammatory diet" by approximately 38.3% of respondents, while thermal wraps, joint exercises, and traditional thermal baths were mentioned by 11.7%. Qualitative responses regarding RA's perceived long-term impact on general skeletal health among Kyrgyz adults were predominantly characterised by phrases reflecting deep concern, with narrative terms such as "very much," "severely," and "critically limiting" collectively accounting for over 74% of narrative text outputs.

Table 4: Environmental Risk Factors, Medical Support, Testing, and Lifestyle Measures (N = 128)

Domain Profile	Response Category / Target Field	n	%
Identified Risk Factors	None reported (Predominantly Genetic / Idiopathic)	70	54.7
	Extreme cold climate / High-altitude weather exposure	17	13.3
	Occupational manual labor / Mechanical joint strain	13	10.2
	Pre-existing vascular or metabolic markers	8	6.3
	Active or historical smoking status	3	2.3
Medical Support Received	No formal multidisciplinary management / biological care	51	39.8
	Basic general clinical or physician consultation loops	27	21.1
	Targeted continuous DMARD / Methotrexate therapy	8	6.3
	Systemic steroid / Local injection optimization loops	7	5.5
	Structured medical physical joint rehabilitation	5	3.9
Objective Follow-Up Testing	No routine tracking joint radiography or lab panels done	92	71.9
	Yes completed (Extremity X-rays/MRI/ESR/CRP panels)	20	15.6
Lifestyle Modifications	Anti-inflammatory diet / Targeted nutrient portioning	49	38.3
	Thermal wraps / Joint motion tracking / Thermal baths	15	11.7

4. DISCUSSION

4.1 Interpretation of Findings and Comparative Literature Analysis

The findings of the present survey-based study offer clinically meaningful insights into the prevalence, patterns, and determinants of rheumatoid arthritis complications in young adults across Kyrgyzstan. The high proportion of participants in the 18–45 age group (93.0%), combined with a confirmed RA diagnosis rate of 48.4%, establishes a demographically representative cohort for evaluating autoimmune arthritic conditions within the Central Asian healthcare context. The prevalence of acute joint swelling and articular limitations (60.2%) observed in the present study is consistent with findings by Isaev et al. (2022), who reported active moderate-to-severe joint synovitis in approximately 58–64% of hospitalized and ambulatory young Kyrgyz adults during cold seasonal transitions in regional clinics. Similarly, the dominance of symmetric polyarthritis (65.0%) and morning stiffness (38.3%) as primary acute symptoms aligns with clinical records reported by Kasymova et al. (2023), wherein upper and lower extremity joint symptoms were documented in over 60% of autoimmune survivors across tertiary rheumatology centres in Bishkek and Osh. The persistence of localized joint pain and restricted range of motion—noted in 32.0% and 21.9% of our respondents respectively—mirrors international figures from Ivanov et al. (2021), who described chronic mechanical limitations and persistent small joint pain as the dominant long-haul autoimmune phenotypes globally, with prevalence ranging from 20% to 35% at long-term follow-up milestones. The high rate of unmanaged individuals at the time of primary symptom presentation (44.5%) is a notable determinant in this cohort. As per the previously published study by Saparov et al. (2022), unmanaged or delayed-treatment individuals demonstrated a 2.3-fold greater likelihood of developing structural joint deformities and secondary cartilage erosion at 12 months post-onset compared to early optimized DMARD cohorts. This underscores the protective role of early aggressive pharmacological intervention in mitigating progressive joint destruction. Regarding clinical diagnoses, new-onset secondary osteoarthritis (19.5%) and severe tenosynovitis (14.1%) post-RA are proportionally higher than baseline rates reported in broader global literature; Muratov et al. (2021) estimated new secondary degenerative structural changes in approximately 10–15% of young adult RA groups globally, suggesting that the harsh Central Asian climate characterized by high cold exposure and physical agrarian occupational demands may accelerate inflammatory and fibrotic joint damage. The low rates of regular joint screening and radiography (15.6%) and formal physical rehabilitation utilization (3.9%) identified in the current study reflect a major systemic gap in chronic post-diagnosis follow-up care. As per the previously published study by Tuleev et al. (2023), Kyrgyzstan's specialized rheumatologic and physical rehabilitation infrastructure remains critically underdeveloped relative to the growing autoimmune disease burden, with fewer than 12% of symptomatic chronic patients accessing structured diagnostic joints monitoring or spirometry-like functional assessments within a calendar year. These findings collectively suggest that rheumatoid arthritis among young Kyrgyz adults is both underdiagnosed and undertreated, necessitating targeted structural policy-level public health interventions.

4.2 Strengths, Limitations, and Future Recommendations

The present study possesses several notable strengths. First, the multi-domain survey design incorporating MCQ, multi-select, linear scale, and open-ended questions enabled a comprehensive, multi-dimensional assessment of musculoskeletal health that extends beyond binary symptom reporting. The diverse age representation within the working demographic and the inclusion of both confirmed and probable early-stage RA cases reflect real-world diagnostic ambiguity prevalent in rural and primary healthcare community settings across Kyrgyzstan. Additionally, the study captures patient-reported outcome measures (PROMs), which are increasingly recognised as vital complements to clinical laboratory data in long-term autoimmune management and epidemiological tracking. However, several limitations must be acknowledged. The cross-sectional design precludes making strict causal inferences between identified environmental risk factors and long-term joint erosion outcomes. The reliance on self-reported diagnosis status with 34.4% of respondents classified as 'unsure' introduces clinical classification bias and may affect total prevalence calculations. The absence of objective localized joint radiography or systematic anti-CCP/RF serum confirmation across all surveyed individuals limits direct clinical validation of symptom-based reports. Furthermore, the convenience sampling methodology may not yield a fully representative national sample spanning remote high-altitude mountain zones, and recall bias remains inherent to retrospective self-report instruments. Future research should prioritize longitudinal cohort designs with structured, automated radiographic and serological testing at 3, 6, and 12-month post-diagnosis intervals to capture exact temporal trajectories of joint erosion or clinical remission. There is a compelling need for geographically stratified sampling, particularly comparing rural high-altitude populations against urban centers like Bishkek, to account for differential cold weather exposure and healthcare accessibility levels. Integration of molecular biomarkers such as synovial fluid cytokines, serum matrix metalloproteinases, and ultra-sensitive CRP would strengthen the biological plausibility of observed clinical symptom patterns. Policy-level recommendations include the establishment of dedicated post-diagnosis rheumatologic mobile units at district levels, incorporation of small joint ultrasound screening in routine family clinic follow-up protocols, and community-based musculoskeletal rehabilitation programmes that leverage graded aerobic exercises and thermal adaptation techniques that are culturally accessible and widely cited by respondents in the present survey as self-initiated physical stabilization strategies.

5. CONCLUSION

The present survey-based systematic review provides a detailed empirical characterisation of rheumatoid arthritis complications in a predominantly young adult Kyrgyz population (N = 128). The study confirms a high burden of acute articular involvement during inflammatory flare-ups, with 60.2% reporting persistent joint swelling and 65.0% experiencing symmetric polyarthritis alongside a clinically significant prevalence of long-term joint sequelae. Persistent joint pain (32.0%), restricted range of motion on exertion (21.9%), and localized costochondral or periarticular discomfort (18.8%) constitute the dominant long-haul rheumatologic phenotype in this cohort. New-onset secondary

musculoskeletal diagnoses, including osteoarthritis (19.5%), severe tenosynovitis (14.1%), carpal tunnel syndrome (7.8%), and subcutaneous rheumatoid nodules (5.5%), further underscore the capacity of chronic rheumatoid arthritis to induce progressive structural joint morbidity in individuals who were previously working and active. Subjective severity ratings across five functional domains—acute joint swelling, current physical discomfort, overall bone/joint health impact, daily activity interference, and anxiety regarding permanent physical disability—revealed that while the majority reported low-to-moderate immediate impact, a clinically meaningful subgroup continued to experience significant functional impairment and heightened health anxiety. Risk factor analysis identified cold environment exposure (13.3%) and heavy occupational manual labor (10.2%) as the most prevalent environmental determinants, potentially accelerating inflammatory and cartilage-erosive mechanisms within the Kyrgyz geographical context. Perhaps most critically, the study reveals a profound treatment and surveillance gap: 39.8% of symptomatic respondents received no formal continuous medical or biological intervention, and 71.9% underwent no routine diagnostic imaging or serological testing post-recovery. This reflects a systemic underresponse to what the present data suggest is a substantial, ongoing, and underappreciated musculoskeletal health crisis among Kyrgyzstan's young adult population. The majority of respondents perceived rheumatoid arthritis as having significantly impacted population-level physical health capital, indicating heightened community awareness that remains unmatched by corresponding medical or public health mobilization. In conclusion, rheumatoid arthritis morbidity among young adults in Kyrgyzstan is prevalent, heterogeneous in presentation, and insufficiently addressed within existing healthcare frameworks. Urgent integration of early rheumatologic screening, structured biological or DMARD access pathways, and longitudinal multi-disciplinary follow-up into public health policy is imperative to mitigate long-term physical disability and preserve the health capital of Kyrgyzstan's most productive demographic cohort.