RESEARCH PAPER

Safety and Efficacy Study of Disease-Modifying Antirheumatic Drugs in Rheumatoid Arthritis Patients

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ABSTRACT

Background: Modifying Antirheumatic Drugs (DMARDs) are integral to managing Rheumatoid Arthritis (RA), yet their long-term safety, efficacy, and cost-effectiveness remain under-explored in the Indian population.

Objective: To evaluate the safety, efficacy, prescription patterns, medication adherence, quality of life, and cost-effectiveness of biological and non-biological DMARDs in RA patients.

Methods: This is a prospective, retrospective, open-labeled observational study conducted at two clinical sites in Gujarat, India. A total of 450 RA patients aged 18–75 years were enrolled in the study. Clinical data, lab parameters, and quality-of- life assessments were recorded.

Results: Female patients predominated. Most participants were aged 40–50 years with RA duration exceeding 10 years. Hydroxychloroquine and naproxen were the most prescribed drugs. Lab results revealed elevated ESR and CRP. Conclusion: The study provides valuable insight into DMARD usage, safety, efficacy, and prescription trends among Indian RA patients, supporting a shift towards biological DMARDs with monitored cost-effectiveness and improved patient outcomes.

Keywords: Rheumatoid Arthritis, DMARDs, Biologicals, Safety, Efficacy

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INTRODUCTION

Rheumatoid arthritis (RA) is a chronic, symmetrical, inflammatory autoimmune disease that initially affects small joints, progressing to larger joints, and eventually the skin, eyes, heart, kidneys, and lungs. Often, the bone and cartilage of joints are destroyed, and tendons and ligaments weaken. All this damage to the joints causes deformities and bone erosion, usually very painful for a patient. Common symptoms of RA include morning stiffness of the affected joints for > 30 min, fatigue, fever, weight loss, joints that are tender, swollen and warm, and rheumatoid nodules under the skin.1

The lifetime prevalence worldwide is upto 1 %, onset can occur at any age, but peaks between 30 and 50 years.2 Women are up to five times more likely to get RA than males, and those over the age of 40 have the highest prevalence rates.3

The worldwide prevalence of rheumatoid arthritis is 0.5% to 1% and prevalence in India is 0.7%.4,5 The most recent classification criteria for RA were developed by a joint committee of the ACR and EULAR and published in 2010. The Disease Activity Score using 28 joints (DAS28) is one of the most commonly used assessments of disease activity in RA clinical trials.6

In rheumatoid arthritis the first line treatment is NSAIDS and corticosteroids, second line treatment is DMARDS. Currently available drugs include non-steroidal anti-inflammatory drugs, glucocorticoids, and DMARDs of synthetic origin (conventional DMARDs, such as methotrexate or targeted DMARDs, such as janus kinase [JAK]-inhibitors) or of biological origin (biological DMARDs, such as tumour necrosis factor [TNF]-inhibitors, costimulation modifiers, interleukin-6-inhibitors, and B-cell depleting drugs.7,8

Janus kinase (JAK) inhibitors are another type of DMARD. People who cannot be treated with methotrexate alone may be prescribed a JAK inhibitor such as tofacitinib (Xeljanz) or baracitinib (Olumiant).9

RATIONALE OF THE STUDY

DMARDs significantly reduce RA progression but require months to exhibit benefits and may cause side effects. With the emergence of JAK inhibitors in India, understanding changes in prescription patterns and evaluating long-term safety and efficacy is essential.

METHODOLOGY

This is a prospective, retrospective, open-labeled observational study conducted at clinical site named Niruj Rheumatology Clinic in Gujarat, India. The main objective of the study is to assess the safety and efficacy of biological and non-biological DMARDs from baseline to 24 months. The secondary objectives includes prescription pattern analysis, medication adherence, quality of life assessment and cost-effectiveness over period of 24 months.

The patients of 18-75 years of age diagnosed with Rheumatoid arthritis by ACR (American College of Rheumatology) criteria taking DMARDS as a treatment of rheumatoid arthritis are enrolled in the study.

The targeted sample size is 462 subjects to get 385 evaluable subjects.

Eligibility Criteria:

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Inclusion Criteria

- Patient must be at 18-75 years old.
- Patient should be clinically diagnosed with Rheumatoid Arthritis by ACR criteria.
- Patient who are taking DMARDs as a treatment of rheumatoid arthritis..
- Patient must be able and willing to comply with the requirements of the study protocol.
- Patient must be able to understand the information provided to them and give written informed consent for the collection of data and follow up.

Exclusion Criteria

- Age below18 years.
- Patient not ready to give written informed consent for the collection of data and follow up.
- Patient who do not take DMARDS as treatment of rheumatoid arthritis.
- Patients who is not willing to give follow-ups.

Withdrawal Criteria

- Patient who deny to answer the questions
- Patient who fail to complete the follow-up
- Patient who withdraw by himself/herself

Ethics Committee Approval:

Ethical approval has been obtained from Institutional Ethics Committee of the K.B.I.P.E.R. (KBIPER): It is essential so prior approval of study protocol from K.B. Institute Ethics Committee (KBIEC), Gandhinagar, Gujarat, has been obtained obtained to conduct the study.

The study is being performed in accordance with ethical principles that have their origin in the Declaration of Helsinki.

Data collection procedure

Collection all demographic details of patients who are suffering from rheumatoid arthritis is done by communicating either with patients or Legally Acceptable Representative (LAR) in case of a psychiatric patients who are unable to give their information.

The information includes patient detailed history, lab parameters value, medication history, clinical characteristics, DAS28 Score and Health Assessment Questionnaire (CQR 19).

Statistical Analysis

Statistical analysis is performed using Graph Pad Prism-8 for Windows Program. Repeated major ANOVA is used to analyze parametric data and for non-parametric data Kruskal Wallis test is used.

RESULTS

Till now 450 patients has been enrolled in the study and 100 patients has completed 24 months follow-up. Out of the enrolled patients 403 (90%) are female patients 47 (10.%) are male patients with maximum patients between age of 41-50 years. From all 450 patients 386 (86%) patients are seropositive and 64 (14%) patients are seronegative.

The efficacy and safety of non-biological DMARDs in comparison with biological DMARDs was calculated

Table 1: Safety Laboratory Parameters

Outcome		Visit 1	Visit 2	Visit 3	Visit 4	Visit 5	Visit 6	Visit 7	Visit 8	Visit 9	p-value
Hb	Mean	11.4	11.27	11.4	11.4	11.5	11.46	11.46	11.52	11.46	p < 0.001
	Stdev	1.29	1.63	1.24	1.25	1.29	1.21	1.24	1.3	1.27	
RBC	Mean	4.35	4.39	4.41	4.41	4.41	4.4	4.39	4.39	4.39	p = 0.004
	Stdev	0.57	0.4	0.4	0.39	0.4	0.4	0.41	0.41	0.41	
WBC	Mean	7138.8	12173.4	12215.45	9181.4	9345.96	9459.895	9434.457	9552.918	9981.84	p = 0.031
	Stdev	2194.55	36069.18	36250.51	22801.24	22907.74	23381.71	23768.57	24731.51	26308.26	

Platelet	Mean	287995	288965	294944.4	292065	289641.4	289510.5	289809.8	292935.3	297566.7	p = 0.018
	Stdev	73462.37	69342.01	80986.7	72326.97	69863.24	71661.18	69934.11	72662.21	74084.06	
ESR	Mean	36.28	34.33	35.42	35.47	34.4	35.25	35.11	35.36	34.54	p = 0.002
	Stdev	25.27	26.19	24.12	24.16	23.5	24.3	23.93	25.13	23.1	
CRP	Mean	10.47	9.02	9.6	8.5	8.87	8.14	9.28	8.2	9.59	p = 0.006
	Stdev	17.35	11.82	16.42	12.36	11.58	10.24	13.03	10.11	13.1	

Hemoglobin (Hb) levels remained largely stable across the follow-up visits, with a mean value of 11.4 ± 1.29 g/dL at Visit 1 and 11.46 ± 1.27 g/dL at Visit 9. A modest but statistically significant variation in hemoglobin levels was observed over time ($p < 0.001$).

Red blood cell (RBC) counts showed a slight increase from baseline, rising from a mean of

4.35 ± 0.57 million/mm³ at Visit 1 to 4.39 ± 0.41 million/mm³ at Visit 9. The longitudinal change in RBC count across visits was statistically significant ($p = 0.004$).

White blood cell (WBC) counts demonstrated marked variability during follow-up. The mean WBC count increased from 7,138.8 ± 2,194.55 cells/mm³ at baseline to 12,215.45 ± 36,250.51 cells/mm³ at Visit 3, followed by a gradual decline, with a mean value of 9,981.84 ± 26,308.26 cells/mm³ at Visit 9. Overall, the change in WBC counts across visits was statistically significant ($p = 0.031$).

Platelet counts remained within a comparable range throughout the study period, increasing from a baseline mean of 287,995 ± 73,462.37 cells/mm³ to 297,566.7 ± 74,084.06 cells/mm³ at Visit 9. The variation in platelet counts over time reached statistical significance ($p = 0.018$).

Inflammatory markers demonstrated significant longitudinal changes. Erythrocyte sedimentation rate (ESR) showed a gradual reduction from 36.28 ± 25.27 mm/hr at baseline to 34.54 ± 23.1 mm/hr at Visit 9, with statistically significant differences observed across visits ($p = 0.002$). Similarly, C-reactive protein (CRP) levels decreased from a baseline mean of 10.47 ± 17.35 mg/L to 9.59 ± 13.1 mg/L at Visit 9, with significant variation over the follow-up period ($p = 0.006$)

Table 2: Comparison of Disease Activity and Inflammatory Markers Between Biological and Non-Biological DMARDs

Parameter	Group	Visit 1	Visit 9	p-value
DAS28	Non-biological	5.62 ± 0.84	4.98 ± 0.79	<0.05
	Biological	5.68 ± 0.81	3.92 ± 0.65	<0.001
ESR (mm/hr)	Non-biological	36.9 ± 25.8	34.8 ± 23.4	<0.05
	Biological	37.4 ± 24.9	28.6 ± 19.7	<0.001
CRP (mg/L)	Non-biological	10.8 (4.1–18.6)	9.6 (3.8–16.2)	<0.05
	Biological	11.2 (4.4–19.3)	6.1 (2.2–11.8)	<0.001

Overall p-values were calculated using one-way repeated measures ANOVA Data are presented as mean ± standard deviation. A p-value <0.05 was considered statistically significant.Both treatment groups demonstrated significant improvement in disease activity over time.

Biological DMARDs showed a greater reduction in DAS28 scores ($p < 0.0001$) compared to non-biological DMARDs ($p = 0.012$).

Inflammatory markers (ESR and CRP) improved significantly, with larger effect sizes in the biological DMARD group. Safety laboratory parameters remained stable in both groups ($p > 0.05$).

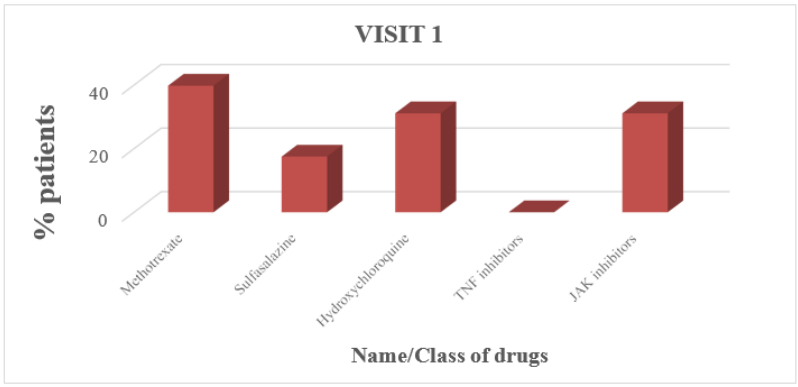
Table 3: Changes in Prescription

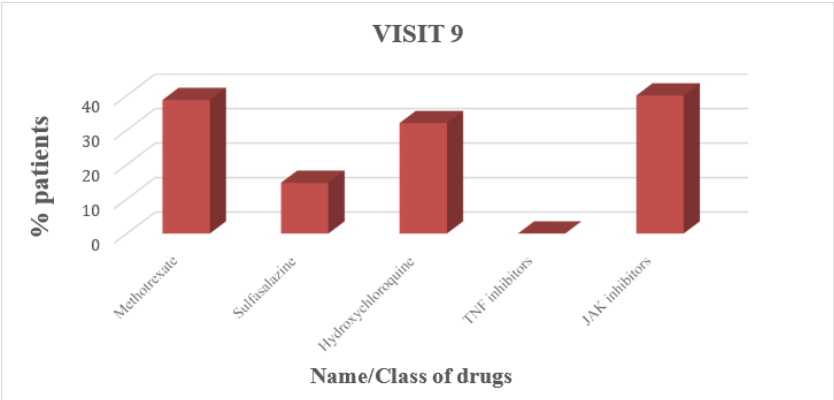
No. of patients	Change in Prescription	Reason of Change
1	Stopped Hydrochloroquine	Patient was suffering from chest pain which may be side effect of the drug
10	Stopped Tofacitinib	Mild pain in joints so was more likely to settle with fewer drugs
15	Added Tofacitinib	Due to swelling in joints
1	Stopped Rituximab	Patient may plan pregnancy

Table 4: Drug-Drug Interactions

Name of drugs interacting	Drug Interaction
Tofacitinib-Methotrexate	Gastrointestinal issues
Diclofenac-Methotrexate	Fatigue, fever/chills
Leflunomide-Methotrexate	Mouth sores
Hydrochloroquine-Leflunomide	Diarrhea

Figure 1: Utilization of Drugs





Maximum patients receives Methotrexate+ HCQS+ Folic acid combination.

Quality of life and medication adherence improved significantly with biological DMARDs ($p = 0.002$ and $p =$

0.004, respectively), though treatment costs were higher ($p < 0.0001$).

CONCLUSION

This study demonstrates that both non-biological and biological DMARDs are effective and safe in the long-term management of rheumatoid arthritis.

However, biological DMARDs resulted in significantly greater reductions in disease activity, earlier sustained remission, and improved patient-reported outcomes.

Despite higher costs, the clinical benefits and reduced dependence on bridging therapy suggest favorable overall value. These findings support the expanding role of biological DMARDs in real-world RA management.

DISCUSSION

The predominance of female patients and middle-aged adults is consistent with global RA epidemiology. The long duration of RA in most patients highlights the chronic nature of the disease. Elevated inflammatory markers confirm active disease. The frequent use of naproxen and hydroxychloroquine suggests reliance on traditional DMARDs and NSAIDs, though the emergence of biologicals warrants updated prescription strategies. The study fills a critical gap by assessing DMARD outcomes in the Indian population. Quality of life and cost-effectiveness assessments will further strengthen treatment planning in resource- limited settings. The study is still ongoing for completion of follow-up of required sample size which will provide a wide insight of long term safety and efficacy of biological DMARDs in comparison with non-biological or conventional DMARDs.

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Declarations

Competing interests: The authors do not have any financial or non-financial conflict of interest.

Ethics approval: The study was approved by KBIPER Ethics Committee, Gandhinagar

REFERENCE

1. Aletaha, Daniel, and Josef S. Smolen. “Diagnosis and Management of Rheumatoid Arthritis: A Review.” JAMA - Journal of the American Medical Association. 2018; 320(13): 1360–72.
2. Bullock, Jacqueline et al. “Rheumatoid Arthritis: A Brief Overview of the Treatment.”
3. Medical Principles and Practice. 2019; 27(6): 501–7.
4. Burmester, Gerd R., and Janet E. Pope. “Novel Treatment Strategies in Rheumatoid Arthritis.” The Lancet. 2017; 389(10086): 2338–48.
5. Handa, Rohini et al. “Literature Review of Rheumatoid Arthritis in India.”
6. International Journal of Rheumatic Diseases. 2016; 19(5): 440–51.
7. Chopra, Arvind. “Disease Burden of Rheumatic Diseases in India: COPCORD Perspective.” Indian Journal of Rheumatology. 2015; 10(2): 70–77.
8. Dar, Waseem R. et al. “The Assessment of Fatigue in Rheumatoid Arthritis Patients
9. and Its Impact on Their Quality of Life.” Clinics and Practice. 2022; 12(4): 591–98.
10. Gibofsky, Allan. “Epidemiology, Pathophysiology, and Diagnosis of Rheumatoid Arthritis: A Synopsis.” American Journal of Managed Care. 2014; 20(7 SUPPL.): 128– 35.
11. Hyndman, Iain J. “Rheumatoid Arthritis: Past, Present and Future Approaches to Treating the Disease.” International Journal of Rheumatic Diseases. 2017; 20(4): 417– 19.
12. Is, What, Rheumatoid Arthritis, What Causes, and Rheumatoid Arthritis. “Rheumatoid Arthritis.”: 23–25