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ORIGINAL RESEARCH ARTICLE

Drug Utilization patterns and medication adherence in the management of Rheumatoid Arthritis

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Abstract

Introduction: Rheumatoid arthritis is a continuing, systemic autoimmune disorder characterised by persistent joint inflammation leading to cartilage destruction, bone erosion, and functional disability. Optimal disease management depends on appropriate drug utilisation, rational prescribing, and sustained medication adherence. To assess the drug utilisation patterns, combination therapy tendencies, and adverse drug reactions among patients with rheumatoid arthritis, and to assess adherence to pharmacological management methods.

Methods: The present study is a cross-sectional study done at a tertiary care hospital in India. The study was done on the drug utilization pattern among 120 patients suffering from arthritis, aged between 18 and 80 years. The study was done for a period of one year. The study was done using Case Record Forms. The study was analyzed using SPSS software version 27. Student's t-test and Chi-square test were done at a p-value of <0.05.

Results: The majority of patients were female (67.5%) and belonged to the 36–50 years age group (45%). Oral administration was the most common route (95%). Preferential COX-2 inhibitors such as diclofenac (33.3%) and aceclofenac (30.3%) were the most prescribed NSAIDs. Among DMARDs, methotrexate monotherapy (23.2%) was frequent, while combination therapy (59.7%) dominated overall. The use of calcium, vitamin D, and multivitamins was notable as supportive therapy. Adverse drug reactions occurred in 21.9% of patients, mainly presenting as gastric discomfort (12.2%) and mild gastrointestinal complaints.

Conclusion: The study concluded that oral medications, preferential COX-2 inhibitors, and combination DMARD regimens constitute the predominant therapeutic approaches in arthritis care, guided by their efficacy and clinical acceptance.

Key words: Rheumatoid arthritis, Drug utilisation, DMARDs, NSAIDs, Medication adherence, Adverse drug reactions.

1 | INTRODUCTION

Rheumatoid arthritis (RA) is autoimmune type of disorder having the arthritis causing inflammation and also the involvement of extra-artery. RA is a chronic inflammatory condition due to the condition due to the interaction among the various genes and the environmental factors (1) . The RA initiates in the peripheral joint which is symmetric in structure. It results in the inflammation of the joint causing damage and the cartilage loss and bone erosions. Symptom of less than 6 month is termed as the early RA and the symptom of more than 6 months is termed as the established RA (2) . A significant increase in the burden of RA was observed between the years 1990 and 2021 in India, which was three times the increase in the rates of incidence, prevalence, and DALYs (3) . The risk of acquiring RA is greater in females than in males. The rates are 2.60 to 2.93 times higher. The female-to-male ratio

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in patients with RA is 5:1 (4) . Although the average age of onset for RA occurs in the late 40s, it has been seen that there are higher rates of RA in urban populations (0.69%) than in rural populations (0.54%) (5) . A significant increase in the socioeconomic burden of RA has been seen, with a significant increase in the rates of RA in females from 594,068 to over two million (Fig 1) (3) .There are various risk factors like the cigarette smoking, which have a strong correlation with the RA. Also the diet or the nutrition have impacted the condition of RA. Western diet is high in the calorie and low in the content of fibre, which impacts the risk of the RA. The consumption of long-chain omega-3 polyunsaturated fatty acids have significantly decreases the RA (6) . Obesity is another major risk factor for RA. The Body Mass Index of patients more than 30 kg/m^2 enhances the risk of the RA by 30%. While the BMI range of 25 to 29.9 kg/m^2 have enhances the risk of RA around 30% (7) . RA is associated with the antibodies like RF and ACPA. The antibodies are specific to the filaggrin which is a citrullinated peptide and the epitope region of the antibodies is also citrullinated peptide. The synthesis of the cyclic citrullinated peptide (CCP) is used for the antibody testing by the ELISA test for the patients (8) . Also these antibodies are known as the anti-cyclic citrullinated peptide antibodies (ACPA). The post translational alteration of the arginine residue which is performed by the peptidyl arginine deiminase (PAD) enzyme results in the Citrulline. The chemical reaction occurs at the site of the damaged tissue causing inflammation. The ACPA is the isotype of IgG, IgM, or IgA and get attached with the residues of Citrulline with some proteins including the vimentin, fibronectin, fibrinogen, histones, and type 2 collagen (9) . The antibodies against the Anti-carbamylated protein or the anti-CarP antibodies are observed among the RA patient. Lysine residue is converted to the homocitrulline by the Carbamlyation reaction, with the presence of urea compound and the cyanate. The conversion of thiocyanate to cyanate is mediated by the Myeloperoxidase enzyme. This anti-Carp antibodies are the specific type of antibodies are connected with the RA patients of both ACPA negative or the ACPA positive patient (10) . Several other autoantibodies have been observed among the RA patient, against the proteins like the fibrinogen, enolase, and vimentin (11) .

2 | MATERIALS AND METHODS

Research Design

This observational, cross-sectional study was showed to assess drug utilisation patterns and adherence among patients diagnosed with arthritis. The research followed ethical procedures, with prior approval obtained from the Institutional Ethics Committee, and written informed consent was secured from all participants before their inclusion. The study duration was conducted for one year. A total of 120 patients clinically diagnosed with arthritis during the study period were included. Participants were enrolled consecutively based on predefined inclusion and exclusion criteria to confirm representativeness and minimise selection bias. Data were collected using a pre-designed Case Record Form. The study documented essential patient information, including demographic characteristics, clinical diagnosis, details of prescribed medications, suspected adverse drug reactions, and any concomitant drug use. All collected data were handled to confirm patient privacy and data integrity.

Inclusion Criteria

- Patients clinically diagnosed with arthritis.
- Both male and female patients aged 18 to 80 years.
- Patients willing to provide written informed consent.
- Patients receiving pharmacological management for arthritis at the study site.

Exclusion Criteria

- Patients below 18 years of age.
- Patients with gastroesophageal reflux disease or peptic ulcer disease, as these conditions may interfere with the administration of certain arthritis medications.
- Pregnant or lactating women, due to potential drug-related risks to the foetus or infant.

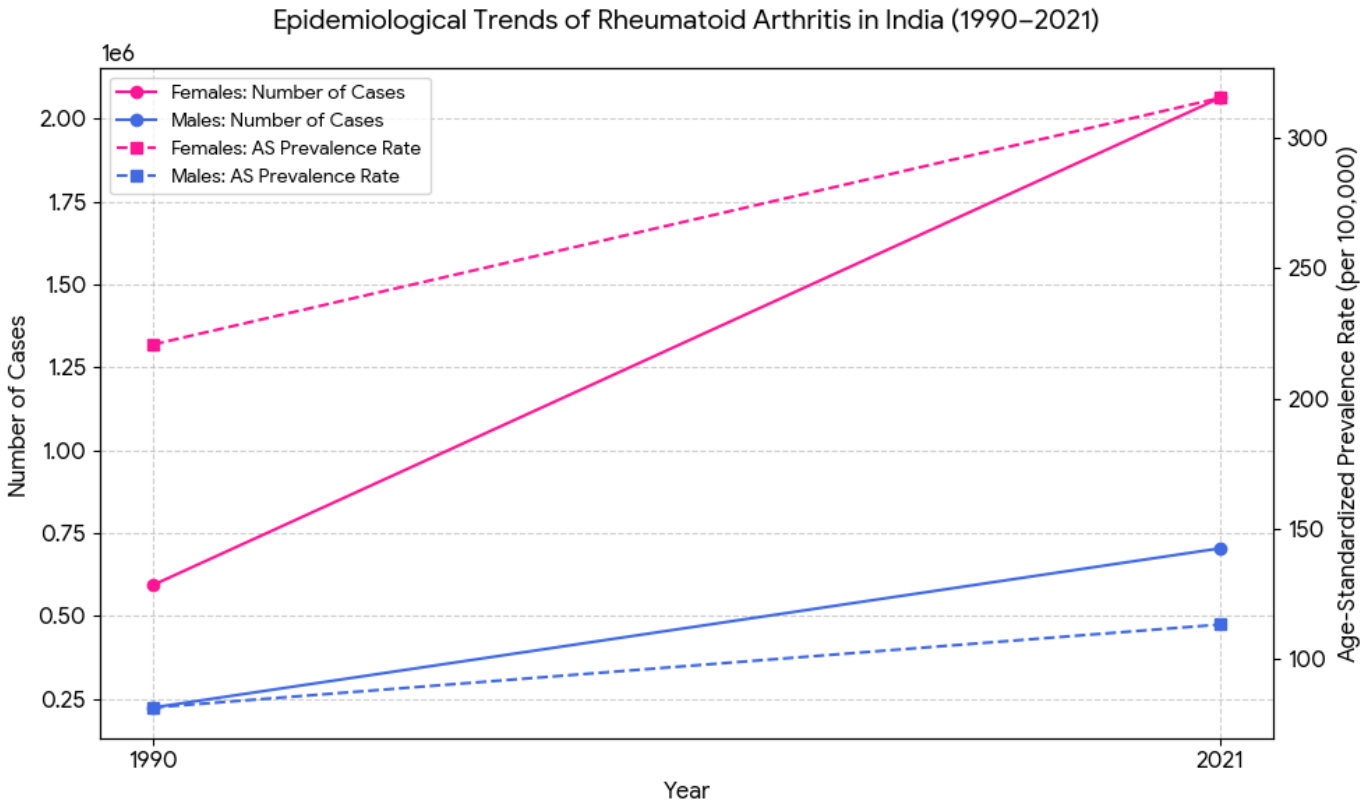

Fig. 1: Epidemiological trends of RA in India

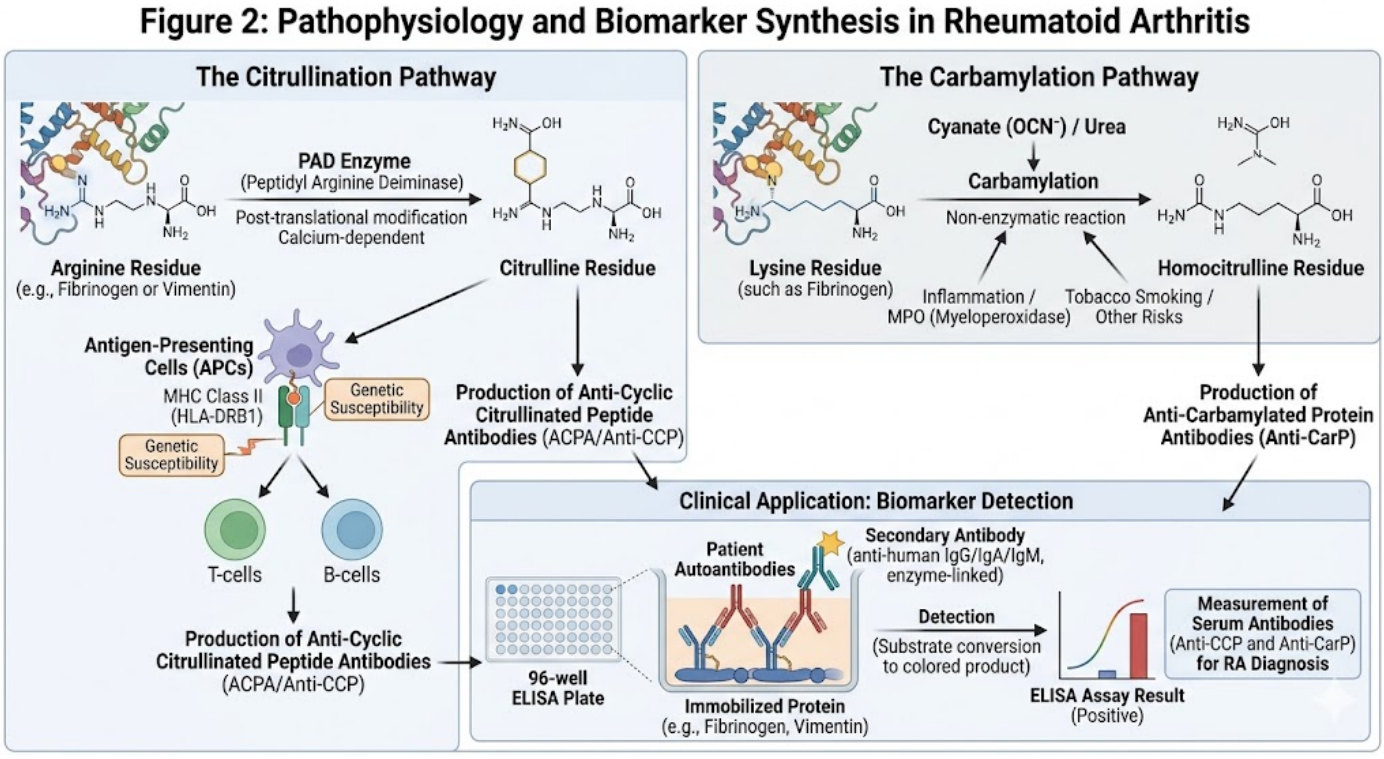

Fig. 2: Pathophysiology and biomarker synthesis in RA

• Patients with pre-existing cardiovascular disorders or significant neurological deficits, as these conditions could influence treatment outcomes.

• Terminally ill patients, who were improbable to contribute meaningful long-term data to the study objectives.

Statistical analysis

Data were collected and analyzed using SPSS 27. Descriptive statistics were employed to summarize demographic and baseline characteristics of the study participants. Continuous variables were presented as mean ± standard deviation, providing an overview of central tendency and dispersion within the data. For inferential analysis, Student's t-test was applied to assess differences between groups for parametric data, while the Chi-square test was used to assess associations between categorical variables. A p-value of less than 0.05 was considered statistically significant, indicating that the observed differences or associations were not likely to have occurred by chance.

3 | RESULTS

Out of the total 120 patients included in the study, 39 were males (32.5%) and 81 were females (67.5%). This indicates a higher prevalence of arthritis among female patients compared to males in the study population Table 1 .

Table 1. Gender Distribution of Study Participants

Gender	Number of Patients (n)	Percentage (%)
Male	39	32.5
Female	81	67.5
Total	120	100

Among the 120 arthritis patients studied, the majority (45%) belonged to the 36–50 years age group, followed by 37.5% in the 51–65 years age group. Patients aged 66–80 years constituted 12.5% of the study population, while the 20–35 years group reported for only 5%. This distribution indicates that arthritis mainly affects individuals in middle and older age groups, which is consistent with the degenerative and inflammatory changes associated with advancing age Table 2 .

Table 2. Age Distribution of Study Participants

Age Group (years)	Number of Patients (n)	Percentage (%)
20–35	6	5
36–50	54	45
51–65	45	37.5
66–80	15	12.5
Total	120	100

In the present study, the majority of drugs prescribed for arthritis patients were administered through the oral route (95%), followed by injectable forms (3.3%) and topical preparations (1.7%). The predominance of oral administration reflects the convenience, patient compliance, and ease of use associated with oral medications in long-term arthritis management. Injectable drugs were used, probably for cases requiring rapid relief from severe inflammation or pain.Table 3

Among the 120 patients included in the study, family history (45%) emerged as the most common risk factor associated with arthritis, followed by old age (39.2%) and obesity (15.8%). The predominance of family history, the genetic predisposition frequently seen in various forms of arthritis, particularly rheumatoid and osteoarthritis Table 4 .

Table 3. Route of Drug Administration among Study Participants

Route of Administration	Number of Drugs (n)	Percentage (%)
Oral	114	95
Injectable	4	3.3
Topical	2	1.7
Total	120	100

Table 4. Distribution of Risk Factors among Study Participants

Risk Factor	Number of Patients (n)	Percentage (%)
Family history	54	45
Old age	47	39.2
Obesity	19	15.8
Total	120	100

In this study, a total of 132 NSAID prescriptions were recorded among 120 arthritis patients. Diclofenac (33.3%) was the most frequently prescribed NSAID, followed closely by Aceclofenac (30.3%), both of which belong to the preferential COX-2 inhibitor class. Nimesulide (12.9%) was also used, reflecting its perceived effectiveness in managing pain and inflammation despite safety apprehensions in certain populations. Among non-selective NSAIDs, Ibuprofen (3.8%) and Piroxicam (3.8%) were prescribed less frequently, possibly due to their higher risk of gastrointestinal adverse effects. Paracetamol (15.9%) was used as an adjunct or first-line analgesic, particularly in mild cases or in patient's intolerant to NSAIDs Table 5 .

Table 5. Distribution of NSAIDs Prescribed among Study Participants

Class of NSAIDs	Drug Name	Number of Prescriptions (n)	Percentage (%)
Preferential COX-2 inhibitors	Diclofenac	44	33.3
	Aceclofenac	40	30.3
	Nimesulide	17	12.9
Propionic acid derivatives	Ibuprofen	5	3.8
Enolic acid derivatives	Piroxicam	5	3.8
Acetaminophen	Paracetamol	21	15.9
Total	—	132	100

Out of 120 patients, 82 (68.3%) received disease-modifying antirheumatic drugs either alone or in combination. Among these, combination therapy (59.7%) was the most frequently used regimen, indicating a preference for multi-drug approaches to achieve better disease control in arthritis, particularly in rheumatoid arthritis. Methotrexate monotherapy (23.2%) was the most commonly prescribed single DMARD, consistent with its well-established role as the first-line agent due to its efficacy, cost-effectiveness, and tolerability. Hydroxychloroquine (9.8%) and Sulfasalazine (7.3%) were used either as alternatives or adjuncts to methotrexate, reflecting their supportive role in combination regimens Table 6 .

Table 6. Distribution of DMARDs Prescribed among Study Participants

Therapy Type	Drug Name / Combination	Number of Prescriptions (n)	Percentage (%)
Monotherapy	Methotrexate	19	23.2
	Hydroxychloroquine	8	9.8
	Sulfasalazine	6	7.3
Combined Therapy	DMARD + DMARD combinations	49	59.7
Total	—	82	100

Among the total 120 patients, DMARD + DMARD combinations (59.8%) were the most commonly prescribed, signifying the importance of synergistic disease control in rheumatoid arthritis. Multivitamin supplementation (58.5%) and Calcium + Vitamin D (26.8%) were also frequently prescribed, aimed at improving general health, preventing bone demineralization, and supporting joint function. Analgesic combinations such as Aceclofenac + Paracetamol (13.4%) and Diclofenac + Paracetamol (9.8%) were used for effective pain relief, while Tramadol + Paracetamol (3.7%) was reserved for patients with moderate to severe pain unresponsive to NSAIDs Table 7 .

Table 7. Distribution of Combination Therapy among Study Participants

Type of Combination Therapy	Number of Prescriptions (n)	Percentage (%)
Aceclofenac + Paracetamol	11	13.4
Diclofenac + Paracetamol	8	9.8
Tramadol + Paracetamol	3	3.7
DMARD + DMARD combination	49	59.8
Calcium + Vitamin D supplements	32	26.8
Multivitamins	48	58.5
Total	120	100

Out of the total 120 patients included in the study, 18 patients (21.9%) experienced adverse drug reactions (ADRs). The most frequently reported ADR was gastric discomfort (12.2%), followed by abdominal pain (3.7%), skin rashes (2.4%), and nausea, vomiting, and dizziness (each 1.2%). No cases of loose stools were reported. The predominance of gastrointestinal symptoms can be attributed to the extensive use of non-steroidal anti-inflammatory drugs, which are known to cause gastric irritation and dyspepsia due to their prostaglandin-inhibiting effects. Skin rashes and dizziness were relatively infrequent and likely related to hypersensitivity or central nervous system effects of certain medications Table 8 .

Table 8. Distribution of Adverse Drug Reactions among Study Participants

Adverse Drug Reaction (ADR) Symptom	Number of Cases (n)	Percentage (%)
Gastric discomfort	10	12.2
Abdominal pain	3	3.7
Nausea	1	1.2
Vomiting	1	1.2
Skin rashes	2	2.4
Loose stools	0	0
Dizziness	1	1.2
Total ADRs reported	18	21.9

4 | DISCUSSION

Indian post-menopausal women are at a heightened risk of developing severe osteoarthritis (OA). A study conducted by Raghuwanshi et al. (2025) on 234 patients with a mean age of 67.4 years showed that increased parity and the resultant fluctuations in estrogen-progesterone levels are significantly related to the progression of OA. The presence of Kellgren-Lawrence Grade 4 OA was significantly seen in 24.0% of the grand multiparous women ($P < 0.01$) (12). In another study conducted by Guria et al. (2025) on 170 clinical attendees with a 70% prevalence of OA, the severity of OA was related to increased BMI and pro-inflammatory cytokines such as IL-6 and TNF-alpha ($P < 0.05$), reflecting the systemic changes in inflammation due to the decline in estrogen levels (13) . A prospective analysis from Central India conducted by Nagpure et al. (2025) consisting of 121 patients, again confirmed a mid-life predominance with a mean age of 46.99 ± 12.84 years. A female predominance of 83.5% was observed, of whom 61.9% presented

with established RA (14) . The gender predisposition reported by our study, with a preponderance of females at 67.5%, is consistent with previous Indian clinical series, where there is a marked preponderance of females by a factor of 5:1. This preponderance of females is further emphasized by the increased risk of the condition in post-menopausal females. With regard to the distribution of our study cohort by age, with 45% of the patients belonging to the 36-50 years age group, our study confirms the mid-life predominance.

The genetic vs. lifestyle profile of our research points towards a significant genetic influence, with family history (45%) emerging as a key risk factor. This again points towards a strong genetic predisposition, as seen in Indian studies on RA. For example, a case-control study conducted by Chinniah et al. (2019) from South India, there was a strong genetic predisposition towards RA with HLA-DRB1 alleles (OR 3.66) and (OR 3.81). However, there was a protective effect (OR 0.17) and (OR 0.15). This points towards a significant genetic influence. Our research points towards the fact that almost half of our population may carry these common epitopes, thereby facilitating the onset of RA at a younger age. The obesity-arthritis relationship was also seen in our research, with obesity (15.8%) emerging as a key risk factor. With increasing BMI levels in urban India, obesity creates a state of inflammaging, a chronic low-grade systemic inflammation, as well as a mechanical stress on weight-bearing joints.

The results of our study are a reflection of the overall Indian prescription pattern, with a 95% choice of oral route of administration, consistent with a multicenter cohort study conducted by Dhir et al. (2024) of 4,061 patients with a mere 2% biologics use due to cost and logistical issues (15) . Although we utilized combination therapy in 59.7% of our cases to treat established disease, we note the continued use of methotrexate as the ”gold standard” drug, consistent with our results. Similarly, our use of Diclofenac (33.3%) and Aceclofenac (30.3%) is consistent with the fact that these agents are the ”workhorse” of NSAIDs with nearly 1.6 billion doses consumed annually worldwide (16) , despite global restrictions. Nimesulide (12.9%) continues to hold relevance in our country because of its quick analgesic action.

A study from Uttarakhand conducted by Mittal et al. (2021) (n=150) found that all patients were given calcium, vitamin D, and folic acid along with DMARDs. This shows how important it is to protect bones (17) . This corresponds with our finding of high multivitamin (58.5%) and calcium/vitamin D (26.8%) usage, which is important in India because 70–90% of the population has subclinical vitamin D deficiency. Another study conducted by Mittal et al. (2023) also showed that simpler, cheaper regimens are much more cost-effective. For example, methotrexate alone costs ₹290.9 per unit DAS28 improvement, while biologic add-ons cost ₹65,661.8. This shows that the affordable adjuvant and supplement strategies used in our current cohort are clinically useful (18) .

An examination of 9,133 arthritis patients conducted by Kim et al. (2019) revealed that PPIs decrease occult gastrointestinal bleeding by 70%, thereby validating their concurrent prescription with chronic NSAID use (19) . Our findings reflect this clinical necessity, with gastric discomfort (12.2%) identified as the predominant adverse effect, likely intensified by elevated NSAID consumption and the endemic prevalence of H. pylori in India. Another study conducted by Mitsuboshi et al. (2024) (n=11,688) warns that PPIs might present a greater AKI risk trend (HR 1.83) in comparison to H2 blockers (20) . Consequently, although acid suppression is essential for managing the gastrointestinal burden observed in our cohort, clinicians must equilibrate this with renal safety and H. pylori eradication.

5 | CONCLUSION

The study has concluded that the oral medications and preferential COX-2 inhibitors remain the principal therapeutic choices in arthritis management, reflecting their effectiveness and patient acceptability. Combination DMARD regimens were widely used, indicating a preference for comprehensive disease control. Gastrointestinal adverse effects were the most common reactions, highlighting the necessity for cautious NSAID use and appropriate monitoring. Overall, the findings emphasize the need for balanced, evidence-based prescribing to optimize outcomes in arthritis care. DMARD therapy and oral routes of administration for improved efficacy

and patient compliance. Methotrexate remained the treatment, either as monotherapy or in combination, while supportive agents such as calcium, vitamin D, and multivitamins were frequently prescribed to increase bone health. Even though the complete adherence to therapy was satisfactory, gastrointestinal side effects, particularly gastric discomfort, were the most reported adverse events. The importance of individualized treatment planning, regular monitoring for potential adverse reactions, and continuous patient education to promote adherence and minimize difficulties. Establishing patient awareness and confirming early detection of side effects can significantly improve long-term results and quality of life in individuals with rheumatoid arthritis.

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