Evaluating the Budget Impact of Introducing Preventive Therapy in the Preclinical Phase for Rheumatoid Arthritis: A Focus on Algerian Female Population at Risk

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Abstract

The early diagnosis and treatment of Rheumatoid Arthritis (RA) are imperative for optimal disease control, greater chances of remission, and prevention of permanent clinical and radiographic damage. This study aims to assess the budget impact of introducing preventive treatment in the preclinical phase for RA among the Algerian population, specifically targeting females at risk. The research compares the budget impact (BI) of this preventive strategy with the current curative approach, incorporating the potential introduction of targeted synthetic DMARDs (tsDMARDs). A systematic literature review provided

epidemiological and clinical data. Two budget impact models were developed over a 5-year time horizon, examining the current curative strategy and the preventive strategy, this one involves early identification and treatment in the preclinical phase. Indirect costs were not considered in both models. Over 5-years, 43.259 RA patients were diagnosed, 53.7% and 32.3% having moderate and severe forms. The overall BI of using conventional and biologic DMARDs is $128.093.332, primarily from medication acquisition. Introducing tsDMARDs may increase the total BI by 0.57% ($128.812.940). The preventive strategy's total BI is $789.529.329, mainly due to implementing an early identification strategy for the 40-60 age group female population (n=28.481.000), accounting for 99.9% of the total cost. With a test sensitivity not exceeding 50%, 712 new patients are eligible for early treatment with Methotrexate (MTX), costing $57.104, potentially rising to $2.880.220 after introducing Rituximab as a preventive treatment. Considering the Algerian healthcare-system, introducing preventive strategies (MTX or Rituximab) after early identification results in a 516% higher budget impact than the current curative approach, even with the introduction of tsDMARDs. Reducing costs requires testing expenses to be below $4.5. Prioritizing curative therapy is crucial until more sensitive tests for early identification are discovered to reduce the economic burden of RA.

Introduction

Rheumatoid arthritis (RA) is a common autoimmune disease characterized by chronic inflammation of joint tissue (1) (2). Affects approximately 0.15% of Algerian population (3), is characterised by chronic inflammation of joints, resulting in disability, work productivity loss, and high societal costs (1).

The burden of RA is expected to continue to increase, with forecasts predicting that there will be 31.7 million individuals worldwide with RA by 2050, 68.7% of whom will be female (1).

The development of treat-to-target strategies and biological disease-modifying antirheumatic drugs (DMARDs) has facilitated better suppression of disease activity and reduced joint destruction. However, rheumatoid arthritis remains a chronic, relapsing, and remitting disease that impairs physical functioning and requires long-standing immunosuppressive treatment. Therefore, there is an unmet need for a therapy that prevents the development of persistent rheumatoid arthritis or reduces the burden of the disease (4).

Early diagnosis and treatment of Rheumatoid Arthritis (RA) are crucial for optimal disease control, greater chances of remission, and prevention of permanent clinical and radiographic damage (5). The joint positivity of RF and ACPA gives the best performance in terms of specificity and positive predictive value (98-100%), making the diagnosis of RA almost certain(6).

Although no treatment was shown to prevent RA onset, early treatment with rituximab and abatacept delayed onset of full-blown RA, and both conventional and biological disease-modifying anti-rheumatic drugs (DMARDs) decreased disease-related physical limitations and increased DAS28-defined remission, at least temporarily (7).

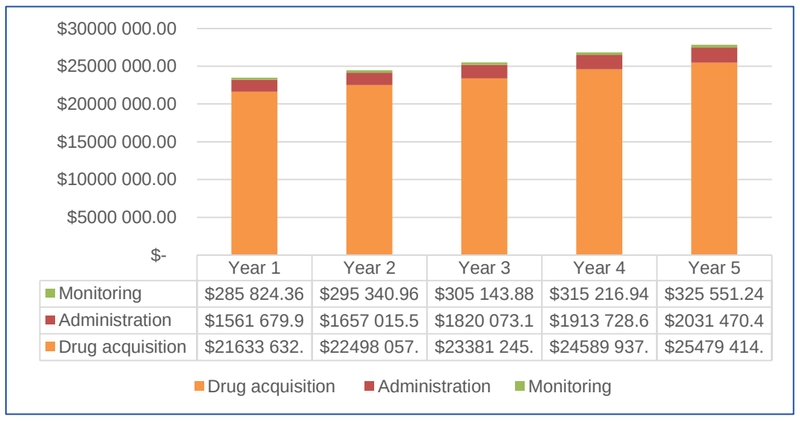
This study aims to assess the budget impact of introducing preventive treatment in the preclinical phase for RA among the Algerian population, specifically targeting females at risk. The research compares the budget impact (BI) of this preventive strategy with the current curative approach, incorporating the potential introduction of targeted synthetic DMARDs (tsDMARDs).

Methods

RA prevalence, incidence and treatment plans in Algeria were examined through a comprehensive literature review. Two budget impact models were developed over a 5-year time horizon from payer perspective, the first aimed to simulate the BI of an early identification and treatment Strategy for the female population in the 40-60 age range, with a high risk of developing RA in preclinical phase, based on testing and early treatment costs. The second was developed to evaluate the potential BI of current curative strategy, incorporating the potential introduction of targeted synthetic DMARDs (tsDMARDs), in RA clinical phase applied for female population in the 40-60 age range with moderate-to-severe RA with an inadequate response to csDMARDs-&-bDMARDs, by determining costs associated with relevant drugs acquisition, Monitoring, and administration. Indirect costs were not considered in both models.

Results

Over a 5-year period, the estimated total number of female patients aged 40-60 diagnosed with rheumatoid arthritis was 43,259. Among these patients, 53.7% had a moderate form of RA, while 32.3% presented with severe forms of the disease. The overall direct cost associated with their treatment using conventional synthetic disease-modifying antirheumatic drugs (CsDMARDs) and biologic disease-modifying antirheumatic drugs (bDMARDs) amounts to $128,093,332. Among these expenses, medication acquisition accounts for 92%, while administration and monitoring costs represent only 7% and 1%, respectively.



	Year 1	Year 2	Year 3	Year 4	Year 5
Monitoring	$285 824.36	$295 340.96	$305 143.88	$315 216.94	$325 551.24
Administration	$1561 679.9	$1657 015.5	$1820 073.1	$1913 728.6	$2031 470.4
Drug acquisition	$21633 632.	$22498 057.	$23381 245.	$24589 937.	$25479 414.

Fig.1: cost associated with treatment using CsDMARDs and bDMARDs

The introduction of non-biologic therapies such as Janus kinase inhibitors (JAKi) could lead to a 0.57% increase in the total cost of treatment over the five years ($128,965, 989 vs $128,093,332), with 92% attributed to medication acquisition and 7% to administration.

The cost of implementing an early identification strategy using Rheumatoid Factor (RF) and Anti-Cyclic Citrullinated Peptide Antibodies (ACPA) testing in the female population aged 40-60 (n=28,481,000) is estimated at $789,472,255 over a 5-year period. This cost represents 99.9% of the total cost, which amounts to $789,529,329.

However, it's important to note that the sensitivity of these tests does not exceed 50% (8). This means that almost half of the existing cases of RA within the targeted population may go undetected using this strategy. The total number of women eligible for early treatment with conventional synthetic disease-modifying antirheumatic drugs specifically Methotrexate (MTX), is estimated to be 712 new patients over the 5 years.

The total cost of early treatment with MTX for these patients is $57,104. However, this cost could increase significantly, up to $2,880,220, if Rituximab is used as a preventive treatment option instead of MTX.

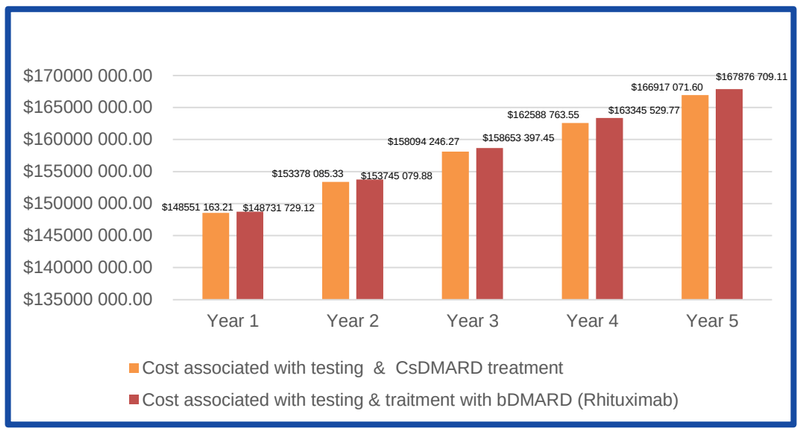


Fig.2 Comparison of Costs Associated with Testing & Treatment. CsDMARD vs. bDMARD (Rituximab)

Conclusion

Considering the Algerian healthcare-system, introducing preventive treatment (MTX or Rituximab) after an early identification strategy using Rheumatoid Factor and Anti-Cyclic Citrullinated Peptide Antibodies testing in the female population aged 40-60 results in a 516% higher budget impact than the current curative approach which utilizes CsDMARDs and bDMARDs, even with the introduction of tsDMARDs such as Anti-JAK in curative strategy, it remains 515% less expensive than the early identification and treatment Strategy. This is attributed to the large number of patients requiring testing, which significantly raises the budget for early identification. This situation could be manageable if the cost of testing is six times less expensive than that applied in the model ($27.7 vs. $4.5). Prioritizing curative therapy is crucial until more sensitive tests for early identification are discovered to reduce the economic burden of RA.

Competing interests

The authors declare that they have no competing interests.

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