



## COST ANALYSIS OF MONOCLONAL ANTIBODIES FOR RHEUMATOID ARTHRITIS USED IN A TERTIARY CARE HOSPITAL

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**ABSTRACT** **Background:** Monoclonal antibodies are costly & are the main reasons for poor compliance in India & with increase in number of monoclonal antibody indications, there can be difficulty in prescribing more cost effective brand to the patient. Therefore it becomes increasingly necessary to examine issues of comparability across different pharmacological agents as well as individual user costs to influence the compliance of patients.

**Aim:** To evaluate the cost of monoclonal antibodies of different different brand names & to analyse price variation among various anti-cancer drugs available in India.

**Methodology:** The Current Index of Medical Specialities android app containing the latest updates was used to analyze the prices of various monoclonal antibodies. The cost of each molecule of different strengths was tabulated and cost range and % price variation were calculated.

**Results:** A wide range of cost variations were seen among different categories of monoclonal antibodies with maximum price variation was observed in Rituximab injection [128.89%]. The least price variation was seen in Tocilizumab and Secukinumab.

**Conclusions:** Price control mechanism has an important role and is very much important to reduce the cost burden of treatment particularly in India.

**KEYWORDS :** Comparison, Monoclonal Antibodies, Indian Brands, Current Index Of Medical Specialities

### BACKGROUND

People all over the world suffer from the pain and disability caused by rheumatic musculoskeletal (MSK) disorders, more popularly known as 'arthritis and rheumatism'. Environmental and immunogenetic factors play a leading role in these multi-causal and often autoimmune disorders. Several amongst them are lifestyle disorders. (1) Musculoskeletal pain and arthritis (MSK) are as old as the human civilization and a major community burden. Rheumatic diseases find mention in the pre-biblical texts of Ayurveda. They cause immense morbidity in terms of poor quality of life, loss of function and productivity and further cause significant socioeconomic burden. Several inflammatory rheumatic diseases cause premature atherosclerosis, vascular complications and early death. All this is difficult to measure. The overall disease burden is likely to be underestimated<sup>[1]</sup>. The treatment of rheumatoid arthritis (RA) has dramatically changed in the last decade since the introduction of the biological agents. Achieving remission in the clinical, functional and radiographic domains has become an achievable target<sup>[2]</sup>. Clinical studies involving biologic agents in RA have been essential to the recent progress in RA treatment. Monoclonal antibodies directed against the pathogenic cytokine and cellular elements within the RA synovium have been the most common form of biologic developed. Monoclonal antibodies (mAbs) are monospecific antibodies that are produced by immune cells that are all clones of a unique parent cell. Initial studies using mAbs in RA utilized anti-CD4, anti-CD7 and CAMPATH-1H as targets, with varying degrees of efficacy and with significant safety concerns. Over the last decade, however, directed against a number of different target molecules mAbs have received US FDA approval for the treatment of RA<sup>[3]</sup>. Systematic monitoring of drug concentrations and ADABs could be potentially beneficial and economically justified, especially given the high costs of biopharmaceuticals and the complexity of clinical decision-making. costs of different TNF- $\alpha$  blockers are not equal, for instance, because dose escalations are more frequent with some of them compared to others. This is obviously because of the varying tendency to generate ADABs<sup>[4]</sup>. This study was designed to evaluate the cost of Monoclonal antibodies of different brand names & to analyse price variation among various monoclonal antibodies available in India.

### MATERIALS & METHODS

The data was collected from the rheumatology department of a tertiary care hospital in India. The data consisted of names of brands along with contents, dosing & indications. Current Index of medical Specialities [CIMS] android app containing the latest updates was used to analyse the prices of anti-cancer drugs prescribed in the hospital. Data about the cost of Monoclonal antibodies drugs was collected for all the strengths and dosage form.

- 1] Cost of a particular drug [per 10 tablets] of various strengths & dosage forms being manufactured by different companies was compared.
- 2] The drugs manufactured by only one company were also included and minimum and maximum cost was written as the same.
- 3] Difference between the maximum & minimum cost of same drug was also calculated  
[cost difference]
- 4] Percentage price variation were calculated for each  
Following formula was used to calculate price variation<sup>[5]</sup>

Percentage price variation =

$$\frac{(\text{Price of most expensive brand} - \text{Price of least expensive brand}) \times 100}{\text{Price of least expensive brand}}$$

Price of least expensive brand

The study was discussed & approved in the departmental review meeting.

### RESULTS

Tables 1: shows the cost variation of different monoclonal antibodies. It was observed that the number of brands varied from 1 to 4, with rituximab having maximum brands. There was substantial evidence in the prices of the different brands available. The maximum price variation was observed in Rituximab injection [128.89%]. The least price variation was seen in Tocilizumab and Secukinumab [0%].

**Table 1: Cost analysis of monoclonal antibodies**

Drug	No of brands included	Strengths	Min Cost [INR]	Max Cost [INR]	Cost Difference [INR]	% Price Variation
Infliximab	2	100mg	36000	41039	5,039	13.99%
Adalimumab	6	40mg/0.8ml x1ml	22000	25000	3000	13.63%
Toclizumab	1	20 mg/ml x 10 ml	20436.19	20436.19	0	0%
Toclizumab	1	20mg/ml x 20ml	40600	40600	0	0%
Toclizumab	1	20mg/ml x 4ml	8112	8112	0	0%
Secukinumab	1	150mg	20,000	20,000	0	0%
Rituximab powder for injection	2	100mg	7138	9466.25	2,328.25	32.61%
Rituximab powder for injection	2	500	36946.87	38541.44	1,594.57	4.31%
Rituximab injection	4	10mg/ml x 10ml	7707	16000	8293	107.60%
Rituximab injection	3	10mg/ml x 50ml	37500	80,000	42500	113.33%
Rituximab injection	3	500mg x50ml	36675.50	77082	43406.50	128.89%

**DISCUSSION:**

Pharmacoeconomics is a branch of health economics with primary focus upon the cost and benefit of drug therapy, thereby providing a guide for decision making on resource allocation and in planning process. Government & private healthcare institutes are targeting curtailment of expenditure on drugs for saving in healthcare costs.[5]

It is very much important for the prescribing doctors to know about the cost of drugs to reduce the price burden on the patient but there are not many studies carried out on the topic. So we undertook the above study.

In our study maximum price variation was seen in rituximab because it was the only drug having more than 3 brands. However it also provided a cheaper alternative to physicians compared to other drugs such as Tocilizumab or Secukinumab which did not provide any cheaper option for the physicians.

Drug prices are controlled according to drug price control act 2013 [DPCO]. Ceiling price of drugs are fixed by national pharmaceutical pricing authority [NPPA] government of India in accordance with DPCO 2013.[6] So far it has fixed ceiling prices of 509 drug formulations included in National list of Essential Medicines. Since May 2014 NPPA has notified prices of 251 formulations under DPCO 2013 resulting in benefit of Rs. 558 crore to consumers.[7]

**Conclusions:**

It is important to create awareness about cost effective prescription via

1. Undergraduate teaching of price of medicines
2. Practical exercise of finding cheapest brand for each molecule
3. Providing doctors updated information of cost of various brands
4. Motivating pharmacists to dispense only those brands which the doctor has prescribed rather than those in which he has maximum benefits.
5. Prescribing generic drugs whenever possible to decrease expenditure of patient on drug.

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