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Treatment Effectiveness of Biologic-DMARDs and their Impact on Disease Control among Rheumatoid Arthritis Patients

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Authors' contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

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ABSTRACT

Objective: The study aimed to evaluate treatment effectiveness of biologic-DMARDs and their impact on overall disease control and management among rheumatoid arthritis patients being treated on biologic-DMARDs.

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Methods: The study was performed among RA patients and disease activity score (DAS) were calculated using DAS 28. Descriptive and inferential statistics were used to obtained the results. Descriptive and inferential statistics were applied using the Statistical Package for Social Sciences (SPSS) version 24.0. A *p*-value < 0.05 was considered statistically significant.
Results: Different demographic characteristics were studied from the selected cohort of the RA patients. Around 89 of the studied patients were males and 64 were females. More than half of the patients were 60 years or above. Around 50% of the patients were diagnosed with RA five years or earlier. Among the studied RA patients, a significant therapy response was obtained which resulted in overall improvement in disease outcomes and showed treatment effectiveness among them.
Conclusion: From the obtained results, it was concluded that all of the studied RA patients received optimum medication therapy with biologic-DMARDs and achieved significant therapy response which resulted in overall improvement in disease outcomes.

Keywords: RA patients; biologic-DMARDs; post-therapy; disease control.

1. INTRODUCTION

Rheumatic disorders (RDs) are among the common causes of immovability, mobility hindrance or/and sometimes permanent disability. They are well-recognized burden on public healthcare systems across the globe [1]. Most of the time, RDs affect joints, bones and muscles partially or completely and are often characterized by autoimmune tissue destruction of various involved organs [2]. Rheumatoid arthritis (RA) is one of the systemic rheumatic disorders that can permanently damage joints, bones and tendons. In addition, RA can also affect articular and extra-articular structures progressively which often leads to pain, disability and even death [3,4]. RA is a chronic disorder that can affect five or more joints, and till today around 1% of the adults are suffered from this disease worldwide [5]. This autoimmune disorder can lead to erosive joints damage and functional deteriorations among RA patients if remain untreated [4-8].

Biologic Disease-Modifying Antirheumatic Drugs (DMARDs) or biologic-DMARDs are a class of rheumatic diseases treating medications that target and affect substances that have significant roles in the pathophysiology and biochemistry of RA [9]. Biologic-DMARDs are usually used when treatment failure happens or low therapeutic effects are achieved with conventional DMARDs. The major and most frequently used biologic-DMARDs are adalimumab, golimumab, etanercept, certolizumab and infliximab. They can be used in combination or/and as single therapeutics agents to treat verities and types of RA. Biologic-DMARDs work on specific targets and are used for various rheumatic disorders like psoriatic arthritis, ankylosing spondylitis, systemic lupus erythematosus and other auto-inflammatory diseases [10].

Recently, many new biologic-DMARDs have been registered by European Medicines Agency (EMA) for the treatment of various inflammatory and rheumatic conditions [11,12]. After the start of biologic-DMARDs therapy, the initial few months are very important and crucial whereby patients have to be well-adhered with the therapy in order to achieve optimal therapy outcomes. These are very effective in the treatment of verities of RA and are also able to reduce systemic inflammation, synovitis and joint disability [11,12]. This study aimed to evaluate treatment effectiveness of biologic-DMARDs and their impact on overall disease control and management among rheumatoid arthritis patients being treated on biologic-DMARDs.

2. MATERIALS AND METHODS

The study was conducted among RA patients. The data was collected from the patients which met the inclusion criteria. A data collection form was specially designed to collect the required information. Informed consent and approval were taken from the study participants before the start of the study. The demographic characteristics observed were gender, age, weight, disease duration, comorbidities and total number of medications patients used before starting biologic-DMARDs. The baseline data was taken right before the start of the study as immediate and recent values/data available in patients' medical record prior to commencement of the biologic-DMARDs therapy. Inclusion and exclusion criteria were designed and only those patients were allowed to take part the study who met the inclusion criteria. Patients aged below 18 years, pregnant women or planning to conceive,

and those who refused to sign the consent form were excluded from the study.

Disease Activity Score (DAS) was used in order to evaluate the general health of the studied RA patients. All of responses to the therapy were recorded on DAS 28 i.e. from the start of the therapy (baseline) to 30 days, 60 days and 180 days as comparators to the baseline. A pilot study was also conducted to test the clinical relevancy of the data collection form. The sample size of the study was calculated using below formula reported in an earlier study [13].

$$n = \left(\frac{z}{m}\right)^2 p(1-p)$$

All statistical analyses were performed using Statistical Package for Social Sciences (SPSS) statistical software version 24. Descriptive statistics were used to describe demographic and clinical characteristics of the studied RA patients. Percentages and frequencies were used for categorical variables, while means and standard deviation were calculated for the continuous variables. Normality distribution was ascertained prior to each analysis and appropriate parametric or non-parametric tests were chosen accordingly. Post-hoc analysis using repeated-measure ANOVA was performed to determine treatment effectiveness after specified intervals.

3. RESULTS AND DISCUSSION

From the obtained results, the females were 89 and males were 64 in the studied population. More than half of the patients were 60 years or above. Around 50% of the patients were diagnosed with RA five years or earlier. A detailed description of the demographic characteristics is provided in Fig. 1.

Table 1 shows the impact of biologic-DMARDs therapy on disease outcomes of the studied patients. The DAS 28 scores were noted at 4 different time slots i.e. at the baseline prior to start of the biologic-DMARDs therapy, after 10 days, 20 days and 30 days of the treatment.

From the study results, the demographic characteristics of the studied population were similar in gender and age to another study conducted by Kuo et al*.,* (2013) in Taiwan which reported that the RA incidence were higher among older adults and studied women [14]. Similar results were also reported in Norway where the incidence rate of RA was also higher among females than males [15]. Similarly, Curtis et al*.,* (2015) found in their study that most of the studied patients who diagnosed with RA and received biologic therapy were females [16].

In literature, numerous earlier studies had also found that the RA incidence often increases with increase in age and reaches at its maximum between 40s to 60s years of age among adults. This may be because hormonal levels and their changes play an important role in gender differences and age among RA patients [17]. In another study, it is also reported that pro-inflammatory hormones i.e. estrogen and prolactin may be responsible for a higher prevalence of RA among females, as females are at higher exposure to these pro-inflammatory hormones especially in their older ages [18]. Progression of inflammation is usually controlled and modulated via estrogen hormone which often causes inflammatory response to be weaken [19].

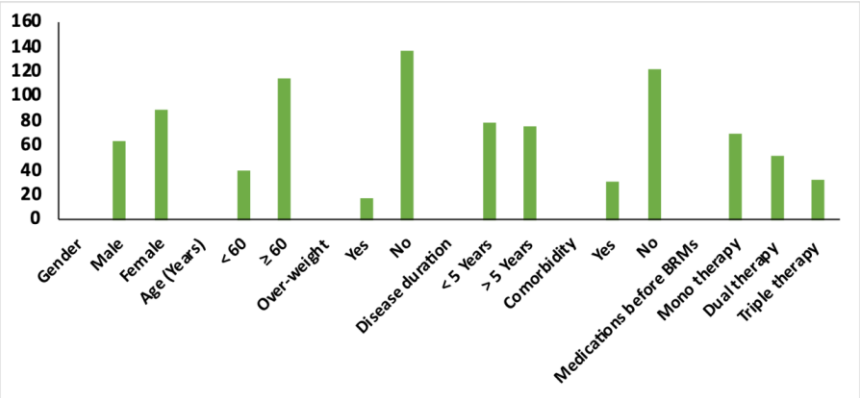

Fig. 1. Demographic characteristics of the RA patients

Table 1. Impact of biologic-DMARDs therapy on disease outcomes

DAS 28 score	n	Mean ± SD
Baseline	153	5.21 ± 1.89
10 days post therapy	153	5.11 ± 1.47
20 days post therapy	153	5.09 ± 2.09
30 days post therapy	153	4.93 ± 1.99

Table 2. Post-hoc analysis for repeated-measure ANOVA

Time (baseline)	Time (post-therapy)	Mean difference	*p*-value
Baseline	10 days	0.985	0.049
	20 days	1.095	0.034
	30 days	1.127	0.009

Table 2 reported repeated-measure for biologic-DMARDs therapy outcomes (treatment effectiveness) at different time intervals. A post-hoc test analysis revealed that BTMs therapy caused a reduction in DAS 28 score from baseline to 10 days (5.11 ± 1.47; p=0.049), further decreased after 20 days from baseline (5.09 ± 2.09; p=0.034) and further decreased after 30 days from baseline (4.93 ± 1.99; p=0.009). All of the DAS 28 obtained results were statistically significant indicating treatment effectiveness and a positive difference in biologic-DMARDs therapy outcomes. In another study, the most frequently used DMARDs were etanercept (n = 2,425; 44.3%), followed by adalimumab (n = 1,857; 33.9%) and golimumab (n = 124; 2.3%) [16]. TNF-α is often considered as a remarkable cytokine that possess a role in intervention of inflammation in RA. In RA patients, levels of TNF-α are thought to be increased in synovium and synovial fluid which can stimulate the inflammation and ease the degradation of bone [21-22].

These results confirmed another previous randomized clinical trial findings where all of biologic-DMARDs showed to be effective in reducing clinical signs of inflammation in RA patients where synthetic disease-modifying agents were not much effective [20,21]. Reduction in DAS 28 scores indicates treatment effectiveness of the biologic-DMARDs therapy among the studied patients from baseline to 30 days. These results also corroborate with similar results reported by two other studies where dramatic reduction of DAS 28 scores was observed after initiation of biologic-DMARDs when compared to DAS 28 scores before initiation of therapy [22,23].

4. CONCLUSION

This study demonstrated that all of the studied RA patients received optimum medication therapy with biologic-DMARDs and achieved significant therapy response which resulted in overall improvement in disease outcomes.

CONSENT

Informed consent and approval were taken from the study participants before the start of the study.

ETHICAL APPROVAL

It is not applicable.

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COMPETING INTERESTS

Authors have declared that no competing interests exist.

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