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ORIGINAL RESEARCH

Real Life Experience of First Course of Anti-TNF Treatment in Ankylosing Spondylitis Patients in Brazil

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ABSTRACT

Introduction: In Brazil, patients with ankylosing spondylitis (AS) have access to free-of-charge comprehensive therapeutic care through the Brazilian National Health System. We collected prospective data on patients with AS receiving anti-tumor necrosis factor (anti-TNF) therapy through the Brazilian National Health System in Belo Horizonte City in order to evaluate the effectiveness, quality-of-life outcomes and safety of this therapy.

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Methods: This was a prospective study that included 87 patients receiving their first course of anti-TNF agents (adalimumab, etanercept or infliximab). The effectiveness of treatment was assessed at 6 and 12 months of follow-up using measures of disease activity [Bath Ankylosing Spondylitis Disease Activity Index (BASDAI)], function [Health Assessment Questionnaire (HAQ)] and quality of life (EuroQol-5D). Good clinical response was defined as an improvement of at least 50% or 2 units in the BASDAI. Episodes of adverse events were recorded. Logistic regression was performed, and odds ratios (OR) with 95% confidence interval (95% CI) were calculated to estimate predictors of good clinical response at 6 months.

Results: At 6 months of follow-up, 64.9% of patients had a good clinical response, as evidenced by a drop in the median BASDAI score from 5.21 to 2.50 ($p < 0.0001$) and a reduction in the HAQ score from 1.13 to 0.38 ($p < 0.0001$). Patients also showed an improvement in health-related quality of life which was sustained after 12 months of follow-up. Female patients achieved a significantly lower clinical response than male

patients (OR 0.29, 95% CI 0.11–0.78), but we observed no significant associations between the other variables. At the end of the study, 93 non-serious adverse events had been reported.

Conclusion: Treatment with the anti-TNF drugs adalimumab, etanercept and infliximab is effective and well tolerated in patients with AS. The improvement in disease activity, functional parameters and quality of life was sustained for 12 months.

Keywords: Adalimumab; Ankylosing spondylitis; Anti-TNF therapy; Disease activity; Etanercept; Health-related quality of life; Infliximab

INTRODUCTION

Ankylosing spondylitis (AS) is a chronic inflammatory disease that mainly affects the spine. Patients with AS can experience progressive stiffness and functional limitation of the axial skeleton, with subsequent increasing disability and a reduced quality of life [1, 2]. Anti-tumor necrosis factor (anti-TNF) drugs are recommended as therapy for patients with high disease activity despite the first-line treatment with nonsteroidal anti-inflammatory drugs (NSAIDs) [3]. Randomized clinical trials and observational studies have shown that patients treated with anti-TNF agents experience a decrease in disease activity and better functionality [4]. The National Register for Biologic Treatment in Finland (ROB-FIN) reported that 52% of patients receiving anti-TNF therapy achieved 50% improvement on the Bath Ankylosing Spondylitis Disease Activity Index (BASDAI) after 6 months [5]; the British Society for Rheumatology Biologics Register reported a very similar outcome in 50% of patients [6].

Evaluations on the impact of long-term use of these drugs in real life settings are required because the impact of anti-TNF therapy on patients may differ from that seen in clinical trials, which usually have short follow-up periods and selection criteria that restrict patients with comorbidities and concomitant drugs. The Brazilian Registration of Spondyloarthritis and the Brazilian Biologic Registry (BIOBADA BRASIL) collects epidemiological and clinical data on the exposure of patients to anti-TNF drugs [7, 8]. However, little is known to date on the effectiveness and quality-of-life outcomes in Brazilian AS patients receiving anti-TNF therapy.

The BIOBADA BRASIL estimated that 400 patients with AS started anti-TNF therapy in 2009 [7]. In 2010, the Brazilian National Health System (SUS) made available the anti-TNF drugs infliximab, etanercept and adalimumab through the Specialised Drug Program which targets drugs used in later stages of treatment of several diseases. The SUS offers free-of-charge access to comprehensive therapeutic care to all Brazilian citizens. In Brazil, there is a mix of public (SUS) and private healthcare services, with 25% of the population having private health insurance. However, those with private healthcare insurance are also eligible to access SUS services, especially in cases where high-cost medicines are not covered by their insurance plan [9]. The inclusion of anti-TNF agents in the SUS may have increased patient access to these drugs in Brazil. The aim of this study was to evaluate the effectiveness, including health-related quality of life (HRQoL), and safety of the first course of anti-TNF therapy and the predictors of good clinical response in AS patients treated through the auspices of the SUS in Belo Horizonte City, Brazil.

METHODS

This was an open prospective study involving patients with AS who had received anti-TNF therapy in Belo Horizonte City, Brazil, from August 2011 to November 2014. Adult patients whose request for treatment with the anti-TNF drugs infliximab, etanercept or adalimumab had been approved by the Specialised Drug Program were invited to participate. According to the Brazilian Therapeutic Guideline, treatment with these anti-TNF drugs is only approved in patients with AS as defined by the Assessment of Spondyloarthritis International Society (ASAS) classification criteria or by the modified New York criteria (established AS) and persistent high disease activity (BASDAI score ≥4) despite the use of two different NSAIDs for 3 months. The recommended doses are etanercept 50 mg once weekly; infliximab 5 mg/kg at 0, 2 and 6 weeks and 8 weekly interval thereafter; adalimumab 40 mg every 2 weeks [10]. Only patients who had started their first course of anti-TNF therapy (naïve to anti-TNF drugs) were included in the study; those with previous use of these drugs were excluded from entry. The index date of follow-up was the day of first dispensation of the anti-TNF agent. The assessments took place at the pharmacies of the Specialised Drug Program at baseline and at 6 and 12 months thereafter.

We recorded socio-demographic variables (such as age, gender, education level, marital status and self-reported race) and assessed the period of time from diagnosis, self-reported comorbidities, previous and current medication for AS, Patient Global Assessment of Disease Activity (PtGA), BASDAI and number of patients who achieved good clinical response. Good clinical response was defined as an improvement in the BASDAI score by at least 50% or by 2 units. The scores were measured using a visual analogue scale (VAS) of 0–10. Functionality and the HRQoL were assessed by the Health Assessment Questionnaire–Disability Index (HAQ) [11, 12] and by the EuroQol-5D (EQ-5D), respectively. The generic EQ-5D questionnaire includes five dimensions of health addressing mobility, self-care, usual activities, pain/discomfort and anxiety/depression and provides a summary of health utility scores derived from a study performed in Minas Gerais state (Belo Horizonte is the capital of Minas Gerais state) [13]. It also contains a vertical VAS ranging from 0 (worst imaginable health state) to 100 (best imaginable health state) [14]. Episodes of adverse events were also recorded.

We calculated the frequency distributions for categorical variables and the median and interquartile range (IQR) for continuous variables. In addition to determining the overall BASDAI score, we described its components separately: fatigue, spinal pain, pain and swelling peripheral joints, enthesitis, and duration of morning stiffness. We compared baseline assessments among patients with a baseline BASDAI ≥4 and BASDAI <4 and applied Student's t test when the values were normally distributed and the Mann–Whitney test otherwise. We compared clinical outcomes at baseline and at 6 and 12 months of follow-up and applied the paired Student's t test when the results were normally distributed and the Wilcoxon signed rank sum test otherwise. Logistic regression and odds ratio (OR) with 95% confidence interval (95% CI) were used to identify predictor factors associated with good clinical response at 6 months. The duration of disease, baseline PtGA, HAQ, EQ-5D, EQ-5D VAS, fatigue, spinal pain, pain and swelling peripheral joints, enthesitis and duration of morning stiffness were included as continuous

variables, whereas age (quartiles), gender, education, race, type of anti-TNF therapy, baseline use of NSAIDs, disease-modifying antirheumatic drugs (DMARDs) and corticosteroid were included as categorical variables. Only statistically significant variables were retained in the final model by the stepwise-backward method. We adopted a significance level of 5%, and the statistical analyzes were performed using SAS version 9.4 for UNIX (SAS Institute Inc., Cary, NC).

Compliance with Ethics Guidelines

This study was approved by the Research Ethics Committee of the Federal University of Minas Gerais, Brazil (ETIC 0069.0.203.000-10). All procedures followed were in accordance with the ethical standards of the responsible committee on human experimentation (institutional and national) and with the Helsinki Declaration of 1964, as revised in 2013. Informed consent was obtained from all patients for inclusion in the study.

RESULTS

Our initial survey identified 98 patients with AS who had received therapy with the anti-TNF agents infliximab, etanercept or adalimumab and initiated follow-up during the study period. Of these, 11 had a prior history of anti-TNF therapy and were excluded from entry. The final patient cohort therefore included 87 patients, of whom 63 and 32 completed 6 and 12 months of follow-up, respectively. The reason for withdraw was not addressed. The characteristics of the study participants are presented in Table 1. Most patients were male (63.3%), the median age was 41.0 (IQR 31.9–51.3) years and the median disease

Table 1 Baseline characteristics of patients with ankylosing spondylitis patients included in the study

Variables	AS patients ($n = 87$)
Age (years)	40.9 (31.1–53.0)
Male gender	57 (65.5)
Education level	
Illiterate	0
Primary	5 (5.8)
Secondary	9 (10.5)
High school	29 (33.7)
University	43 (50.0)
Race	
Brown	43 (49.4)
White	39 (44.8)
Black	4 (4.6)
Native population	1 (1.2)
Marital status	
Single	29 (33.7)
Married	50 (58.1)
Others	7 (8.1)
Disease duration (years)	
All patients	4.0 (1.0–11.0)
Patients with baseline BASDAI ≥ 4	4.0 (1.0–12.0)
Patient with baseline BASDAI <4	1.25 (0.4–6.0)
Previous DMARD use	47 (54.0)
Comorbidities	
Hypertension	18 (20.7)
Lipids disorder	9 (10.3)
Osteoporosis	4 (4.6)
Diabetes	2 (2.3)
Ulcer	3 (3.5)

Values in table are presented as the median with the interquartile range (IQR) in parenthesis or as the number (n) of AS patients with the percentage of the total in parenthesis

AS ankylosing spondylitis, *DMARDs* disease-modifying antirheumatic drugs, *BASDAI* Bath Ankylosing Spondylitis Disease Activity Index

Table 2 Use of therapeutic drugs by patients with ankylosing spondylitis at baseline and at 6 and 12 months of follow-up

Drugs	Baseline ($n = 87$)	6 months ($n = 63$)	12 months ($n = 32$)
Anti-TNF			
Adalimuamb	60 (69.0)	45 (79.0)	20 (76.9)
Etanercept	21 (24.1)	10 (17.5)	5 (19.2)
Infliximab	6 (6.9)	2 (3.5)	1 (3.9)
Concomitant drug			
Corticosteroid	32 (36.8)	16 (28.1)	7 (26.9)
NSAID	31 (35.6)	13 (22.8)	6 (23.1)
DMARD	24 (27.6)	15 (26.3)	5 (19.2)

Values in table are presented as the number (n) of patients with the percentage given in parenthesis

Anti-TNF anti-tumor necrosis factor, *NSAID* nonsteroidal anti-inflammatory drug

duration was 4.5 (IQR 1.0–12.0) years. At baseline, 36.8% patients were using corticosteroids, 35.6% were using NSAIDs and 27.6% were using DMARDs (mainly methotrexate); during the follow-up, the frequency of concomitant therapy dropped (Table 2).

At baseline, 64 (73.6%) patients had a BASDAI score of ≥4. Compared to patients with a BASDAI score of <4, these patients had a longer disease duration ($p = 0.0266$; Table 1), worse assessment on the PtGA, HAQ and EQ-5D ($p < 0.0005$), and similar EQ-5D VAS ($p = 0.1700$) (data not shown). Among patients with a baseline BASDAI score of ≥4, 63.1 and 64.7% achieved a BASDAI score of <4 at 6 and 12 months, respectively.

At 6 months of follow-up, 64.9% of patients achieved a good clinical response. The reductions in both the median PtGA score from 6.90 (IQR 3.80–8.70) at baseline to 3.20 [IQR 0.80–6.60 at 6 months ($p < 0.0001$)] and the median BASDAI score from 5.21 (IQR 3.79–6.61) at baseline to 2.50 (IQR 0.99–4.48) at 6 months ($p < 0.0001$) were statistically significant. The scores for fatigue, spinal pain, pain and swelling peripheral joints, enthesitis and duration of morning stiffness also decreased from baseline. Of 26 patients who were assessed at 12 months, 65.4% had achieved a good clinical response, with reduced scores for PtGA, BASDAI, spinal pain, enthesitis, and duration of morning stiffness compared to baseline. Changes in the fatigue and pain and swelling peripheral joints scores, however, were not statistically significant. An improvement in functionality and HRQoL was achieved at 6 months and maintained after 12 months of therapy. After 6 months, the median value of the HAQ decreased from 1.13 (IQR 0.63–1.50) at baseline to 0.38 [IQR 0.13–1.13 ($p < 0.0001$)] (Table 3). In the final multivariate model, female gender was associated with a worse clinical response (OR 0.29, 95% CI 0.11–0.78; $p = 0.0141$); the other covariates were not significant (Table 4).

At the end of the study, 93 adverse events had been reported by 56 (57.1%) patients, with the most common being headache (16.1%), influenza (14.1%) and application site reaction (14.0%). A number of cases of infection were

Table 3 Disease activity and health quality assessment of patients with ankylosing spondylitis at baseline and at 6 and 12 months of follow-up

Variables	Baseline (n = 87)	6-month follow-up (n = 63)			12-month follow-up (n = 32)		
		Absolute value	Change from baseline	p value[a]	Absolute value	Change from baseline	p value[a]
Patient Global Assessment of Disease Activity	6.90 (3.80–8.70)	3.20 (0.80–6.60)	−1.95 (−4.00 to −0.40)	<0.0001	2.65 (0.20–4.20)	−3.50 (−6.50 to −0.20)	0.0007
BASDAI	5.21 (3.79–6.61)	2.50 (0.99–4.48)	−2.14 (−3.29 to −0.49)	<0.0001	2.25 (0.50–4.29)	−2.28 (−3.60 to −0.10)	<0.0001
Fatigue	5.00 (2.50–7.60)	2.45 (0.40–5.20)	−0.90 (−3.60 to 0.70)	0.0018	3.10 (1.40–5.80)	−0.05 (−2.70 to 1.30)	0.2583
Spinal pain	7.30 (4.80–8.90)	3.45 (0.80–6.05)	−1.95 (−4.50 to −0.20)	<0.0001	2.75 (0.60–6.20)	−2.50 (−6.70 to −0.10)	0.0005
Pain and swelling peripheral joints	3.80 (1.00–6.20)	1.40 (0.0–4.95)	−0.60 (−3.20 to 0.65)	0.0113	0.85 (0.30–5.20)	−0.45 (−2.40 to 0.20)	0.0924
Enthesitis	5.80 (2.70–8.40)	1.65 (0.0–4.30)	−1.70 (−4.85 to 0.0)	0.0002	0.55 (0.0–6.20)	−2.65 (−5.30 to −0.30)	0.0002
Morning stiffness (min)	5.76 (2.76–9.00)	2.88 (0.0–6.00)	−1.56 (−5.16 to 0.0)	<0.0001	1.98 (0.36–4.56)	−4.38 (−5.64 to −0.24)	<0.0001
HAQ	1.13 (0.63–1.50)	0.38 (0.13–1.13)	−0.25 (−0.63 to 0.0)	<0.0001	0.25 (0.0–0.75)	−0.56 (−1.0 to −0.13)	<0.0001
EQ-5D	0.66 (0.47–0.75)	0.75 (0.59–1.00)	0.12 (−0.03 to 0.19)	0.0002	0.83 (0.66–0.88)	0.12 (0.06–0.30)	0.0004
EQ-5D VAS	65.0 (50.0–70.0)	75.0 (60.0–90.0)	10.0 (0.0–25.0)	<0.0001	85.0 (70.0–90.0)	22.5 (0.0–30.0)	<0.0001

Values in table are presented as the median with the IQR in parenthesis

HAQ Health Assessment Questionnaire, EQ-5D EuroQol-5D, VAS visual analog scale

[a] Compared to baseline

Table 4 Factors associated with good clinical response after 6 months of anti-tumor necrosis factor therapy in patients with ankylosing spondylitis: logistic regression models

Variables	Univariate analysis OR (95% CI)	Multivariate analysis OR (95% CI)
Age		
First quartile	1.00 (reference)	–
Second quartile	0.67 (0.20–2.23)	–
Third quartile	1.31 (0.41–4.23)	–
Fourth quartile	0.44 (0.13–1.53)	–
Gender		
Male	1.00 (reference)	1.00 (reference)
Female	0.27 (0.10–0.74)	0.29 (0.11–0.78)
Education level		
University	1.00 (reference)	–
Others	1.28 (0.54–2.99)	–
Race		
White	1.00 (reference)	–
Others	1.12 (0.48–2.63)	–
Disease duration	0.99 (0.94–1.04)	–
Anti-TNF agent		
Adalimumab	1.00 (reference)	–
Etanercept	0.31 (0.10–0.96)	–
Infliximab	0.50 (0.09–2.94)	–
Baseline use of DMARDs	0.95 (0.37–2.47)	–
Baseline use of NSAIDs	0.64 (0.26–1.57)	–
Baseline use of corticosteroids	0.88 (0.37–2.14)	–
Baseline Patient Global Assessment of Disease Activity	1.00 (0.99–1.02)	–
Baseline fatigue	0.99 (0.98–1.01)	–
Baseline spinal pain	1.00 (0.98–1.01)	–
Baseline pain and swelling peripheral joints	1.00 (0.98–1.01)	–
Baseline enthesitis	0.99 (0.98–1.01)	–
Baseline morning stiffness duration	1.00 (0.98–1.01)	–
Baseline HAQ	0.46 (0.22–0.96)	
Baseline EQ-5D	6.18 (0.49–77.90)	–
Baseline EQ-5D VAS	1.02 (0.99–1.04)	–

OR odds ratio, *CI* confidence interval

Table 5 Adverse events reported by patients with ankylosing spondylitis during 12 months of follow-up

Adverse events	n (%)
Headache	15 (16.1)
Influenza	14 (15.1)
Application site reaction	13 (14.0)
Alopecia	9 (9.7)
Nausea	8 (8.6)
Pruritus	8 (8.6)
Urinary tract infection	5 (5.4)
Upper respiratory infection	3 (3.2)
Diarrhea	3 (3.2)
Migraine	2 (2.2)
Epistaxis	2 (2.2)
Fungal infection	2 (2.2)
Rash	2 (2.2)
Allergic rhinitis	2 (2.2)
Urticaria	2 (2.2)
Fever	2 (2.2)
Fragility bone fracture	1 (1.1)
Total	93 (100)

observed, including five urinary tract infections, three upper respiratory infections and two fungal infections (Table 5).

DISCUSSION

This is the first study to evaluate patients with AS who were treated with anti-TNF through the assistance of a public drug program in Brazil. Our study followed-up patients who were diagnosed with AS according to the Brazilian Therapeutic Guideline and treated with anti-TNF drugs in the city of Belo Horizonte. All patients enrolled in the study were from a real-life clinical setting. Our findings showed an

improvement in disease activity, functionality and HRQoL after 6 months of anti-TNF therapy and sustained benefits within 12 months, with the exception of fatigue and pain and swelling peripheral joints. After 12 months of follow-up, 65.4% of patients achieved a good clinical response, with a median reduction in the BASDAI and HAQ scores of 2.28 and 0.56, respectively.

The selection of the most appropriate therapeutic option for use in clinical practice should be based on effectiveness, safety, convenience and cost. It is essential that the decision-making process be based on evidence acquired in studies which have applied the systematic and appropriate methods for each type of question. Within this framework, our results provide good evidence for the effectiveness of anti-TNF therapy in AS patients. Our evaluation of the clinical effectiveness of the patients is that the Braziian Specialised Drug Program has adopted an efficient and a valuable strategy to bring therapeutic benefits to the Brazilian patient population and to increase access to high-cost drugs.

Our results are in agreement with those of previous studies and indicate that adalimumab, etanercept and infliximab are effective agents to treat AS. Both the Finnish and British registers reported that approximately one-half of their patients with AS achieved 50% improvement on BASDAI at 6 months of follow-up. Patients from the British Register were also reported to have achieved improvement in their Bath Ankylosing Spondylitis Functional Index (BASFI) score (mean change −2.6), C-reactive protein (CRP) level and erythrocyte sedimentation rate (ESR) at 6 months [5, 6]. The Danish Nationwide Rheumatological Database (DANBIO) Register reported that 63% of AS patients achieved a 50% improvement or a reduction of 2 units on

the BASDAI up to 6 months of therapy and that the BASDAI score fell from a median baseline value of 5.9 to a median value of 2.6 at 6 months, and then to 21 at 12 months. A clinical response was also observed for BASFI, Bath Ankylosing Spondylitis Metrology Index (BASMI), pain and fatigue and was sustained more than 5 years [15]. Other studies have evaluated the HRQoL using the Short Form 36 (SF36) and found clinical improvement after 4 and 6 months of etanercept and infliximab therapy [16, 17].

In our patient cohort, male gender was a good predictor of clinical response. Another Brazilian study involving patients with spondyloarthritis reported that female gender was associated with more painful and swollen joints and higher BASDAI and BASFI scores [18]. An Italian study found that male AS patients had higher chances of achieving a partial remission response after 12 months of anti-TNF therapy than female AS patients (OR 2.05, 95% CI 1.09–3.84), but that after 24 months the difference was not significant (OR 1.30, 95% CI 0.60–3.04) [19]. In contrast, the Danish Registry found a non-significant association with gender [15]. Fibromyalgia affects 15% of AS patients in a male:female ratio of 1:3, and its symptoms of morning stiffness, fatigue and pain can lead to a confounding effect in the disease activity measure with BASDAI [18, 20, 21]. We found that concomitant baseline therapy with NSAIDs, corticosteroids or DMARDs did not affect the clinical response and that the proportion of patients in combination therapy with these drugs had decreased after 6 and 12 months of follow-up. It is most likely that treatment with the anti-TNF agent played a major role in relieving the symptoms in our patients. However, the question of whether or not anti-TNF + DMARD combination therapy is

a predictor of good clinical response is still open to debate, and the answer likely depends on the magnitude of peripheral joint involvement of the AS patients. Other studies have reported that younger age, higher levels of ESR and CRP, lower baseline BASFI score and higher baseline BASDAI score are associated with BASDAI-50 response, whereas the variables of anti-TNF drug and disease duration did not reach statistical significance [6, 15].

In our study, 36.8% of patients were using corticosteroids on baseline and 26.9% were still using corticosteroids after 12 months of follow-up, probably to treat peripheral or extra-articular manifestations, since the use of corticosteroids for axial disease is not supported by current evidence [3, 22]. However, we could not confirm this supposition because we did not address the reasons for corticosteroid use in our study. The frequency of corticosteroid use among patients with AS has been found to be lower in other studies, ranging from 15 to 30% at the start anti-TNF therapy [5, 6]. Thus, our results should raise awareness of the potential for the irrational prescribing and use of these drugs given the risks associated with their chronic use.

The anti-TNF therapy was well tolerated, with patients reporting primarily minor adverse events and few infections. The BIOBADA BRASIL reported that one-third of AS patients discontinued therapy due to adverse effects [23], and Glintborg et al. [15] reported a similar rate among Danish patients. Conversely, other studies have reported that adverse events were the major reason for drug discontinuation [24, 25].

In our study, one-fourth of patients had a baseline BASDAI score of <4, which means that they did not meet the inclusion criteria of the Brazilian Therapeutic Guideline to start anti-TNF therapy [10]. This may indicate that there is a trend in Brazil towards initiating anti-TNF therapy in an earlier stage of disease,

which in turn opens up the discussion on heathcare providers' awareness of and compliance to the Brazilian recommendations and whether the early initiation of anti-TNF therapy in AS patients is reasonable. Indeed, results from the Norwegian Disease Modifying Antirheumatic Drug (NOR-DMARD) register shows that baseline disease activity scores, CRP and disease duration decreased significantly from 2002 to 2011 among patients with axial spondyloarthritis initiating biological therapy [26].

One limitation of our study relates to the method applied to contact the patients. Only those who visited the specified pharmacies were eligible to participate in the study and to be followed-up at 6 and 12 months. The drug can be dispensed for a family member if the patient is not able to attend the pharmacy; thus, patients with severe AS may not have been included in the study and/or may have withdrawn during the follow-up, which could have biased the number of reports of serious adverse events. Throughout the study period, the waiting time for medication dispensing at the pharmacies became shorter due to improvements in organization. As patients were frequently assessed while they were waiting for their medication dispensing, the better organization may have resulted in fewer patients being willing to be interviewed. This potential for decrease in the number of patients being interviewed together with the commonly known reasons of therapy discontinuation, such as loss of efficacy and adverse events, could have contributed to the high withdraw rate observed at the 12-month follow-up [15, 18]. Other studies have shown that the 1-year anti-TNF drug survival can range between 70% and 83% among AS patients [27, 28].

The lack of access to the clinical data for a number of patients is also a limiting factor in our study. These patients had the diagnosis of AS confirmed by their physician in accordance with the criteria of the Brazilian Therapeutic Guideline, but additional information on their clinical status was unavailable. We also were unable to determine the motivation underlying the initiation of anti-TNF therapy in patients with a BASDAI score of <4. In addition, laboratory indices, such as CRP, ESR and positivity for HLA-B27, were not assessed in our study.

CONCLUSION

Our results show that anti-TNF therapy is very effective in treating AS and that it is well tolerated among patients enrolled in our study. The improvement in disease activity, functionality and quality of life was good and sustained for 12 months. Baseline concurrent DMARD treatment was not found to be a predictor of good clinical response. Men achieved better outcomes than women. Our findings help to translate clinical trial results into the benefits observed in real life settings and reinforce the results found in literature. Furthermore, our investigation contributes valuable information in terms of improving our understanding of the profile and therapy outcomes of patients assisted by the Specialized Drug Program in Brazil. Our results provide relevant evidence to support decisions made by physicians, healthcare providers, and policymakers that can help to improve health care at both the individual and population levels. Further studies should focus on evaluating the benefits of switching between biologics and applying the health utility score obtained by EQ-5D in economic analyses.

ACKNOWLEDGMENTS

Disclosures. All of the authors declare that they have no conflict of interest.

Compliance with ethics guidelines. This study was approved by the Research Ethics Committee of the Federal University of Minas Gerais, Brazil (ETIC 0069.0.203.000-10). All procedures followed were in accordance with the ethical standards of the responsible committee on human experimentation (Research Ethics Committee of the Federal University of Minas Gerais, Brazil) and with the Helsinki Declaration of 1964, as revised in 2013. Informed consent was obtained from all patients for being included in the study.

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