

Use of complementary and alternative medicine in patients with ankylosing spondylitis

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Abstract

Objective: Some studies have shown that the use of complementary and alternative medicine (CAM) is common in patients with chronic painful conditions, such as ankylosing spondylitis (AS). This study aimed to determine the prevalence and types of CAM usage in patients with AS and to evaluate the impact of treatment adherence and beliefs about medicines on CAM usage.

Methods: This study has a descriptive design. A total of 140 patients with AS were included. The treatment adherence of the patients was evaluated using the Morisky Green Levine Medication Adherence Scale. The Beliefs about Medicines Questionnaire (BMQ-T) was used to assess patients' beliefs about medicines.

Results: Previous or current CAM usage was stated by 40% of the patients. It has been found that CAM usage was significantly high ($p < 0.05$) in patients who were married, older, and diagnosed at older ages. The difference between patients' beliefs about medicines and CAM usage was not statistically significant ($p > 0.05$). The BMQ-T scores were significantly different in terms of the patients' treatment adherence ($p < 0.05$).

Conclusion: This study showed that approximately half of the patients with AS were using 1 CAM method. Furthermore, medication adherence and patients' beliefs about medicines did not have any impact on CAM usage, but the patients' beliefs about medicines affected treatment adherence.

Keywords: Ankylosing spondylitis, beliefs, complementary therapies, medicine

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Introduction

Ankylosing spondylitis (AS) is a chronic inflammatory rheumatic disease, and inflammatory back pain is usually the first and most prevalent symptom of the disease. Sacroiliitis, spondylitis, peripheral arthritis, and enthesitis are the main musculoskeletal manifestations of the disease. The course of the disease is usually progressive in nature. Therefore, a tight control of the disease is essential to prevent functional deterioration (1). The optimal treatment of patients with AS includes both nonpharmacological and pharmacological modalities. It is recommended that treatment of patients with AS should be individualized by considering the patients' signs and symptoms and other characteristics, such as accompanying diseases and psychosocial conditions. Medical treatments include nonsteroidal anti-inflammatory drugs (NSAIDs), tumor necrosis factor alpha (TNF- α), and interleukin (IL)-17A inhibitors (2). Although it has not been mentioned among the standard AS treatments, complementary and alternative medicine (CAM) modalities have been widely used by AS patients (3-5).

Because every country describes it differentially, there is no universal consensus about what CAM is. The World Health Organization (WHO) defines CAM as the healthcare practices that involve different approaches to understand the beliefs related to medicines of plant or animal origin and other traditional or spiritual approaches to control the disease (6). Complementary health approaches include natural products, such as herbs (also known as botanicals), probiotics, minerals, and vitamins, and mind and body practices, such as meditation, yoga, acupuncture, chiropractic and osteopathic manipulation, and relaxation techniques, which further include guided imagery, breathing exercises, and progressive muscle relaxation (7).

Despite availability of effective treatment options, such as TNF- α and IL-17A inhibitors, in recent years, satisfactory effect cannot be achieved in some patients or the effective treatment cannot be continued. It has been reported that the most common reasons for discontinuing or switching TNF- α inhibitors were the lack of efficacy (14%-68%), loss of efficacy (13%-61%), and adverse events or poor tolerability (13%-57%) (1, 8). It is also commonly observed that patients have been using CAM for many reasons, including potential risks and inaccessibility of biological treatments. A widespread belief that these modalities lack side effects

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is another important reason for their preference by patients (4).

In previous studies, the CAM usage in patients with rheumatic diseases has been reported to be common and varies between 22% and 95% (3, 9, 10), but studies evaluating the use of CAM in patients with AS are limited (3, 5, 11). The exercise programs, behavioral changes, diet modifications, and deep-tissue massages were all reported to be useful in small studies; however, the motives behind the use of such treatments are not sufficiently addressed (3, 4).

With regard to the motives leading to the use of CAM by patients with AS, it has not been established yet whether there is any relation between CAM usage and patients' beliefs about medicines, treatment compliance, and disease characteristics. Previous studies conducted in different disease conditions (12-14) showed no relation between the CAM usage and medication adherence. In addition, patients' beliefs about medicines may affect both treatment adherence (15) as well as patients' preference to use CAM or other nondrug therapies. It may be important to define CAM usage and its reasons in patients with AS for referring the patients to appropriate treatment and improve patients' treatment adherence. To our knowledge, this is the first study that evaluated the impact of medication adherence and beliefs about medicines on CAM usage in patients with AS. The objectives of this study were to determine the prevalence and types of CAM usage in patients with AS and to evaluate the impact of medication adherence and beliefs about medicines on CAM usage.

Methods

Study design, sample, and setting

This study was designed as a descriptive research. This study was conducted in a tertiary rheumatol-

ogy outpatient clinic between September 2014 and October 2016 and was approved by the Ethical Review Board of Gülhane Military Medical Academy (Approval Date: February 12, 2014; Approval Number: 50687469-1491-202-14/1648.4-366). Written consent was obtained from each participant before any study-related procedure, which was performed in accordance with the principles of the Helsinki Declaration.

Patients with AS who were being followed up at the tertiary rheumatology outpatient center were invited to participate in this study. The inclusion criteria were as follows: (i) meeting the modified New York criteria for AS (16), (ii) using at least 1 antirheumatic drug (e.g., NSAIDs, sulfasalazine, TNF- α , or IL-17A inhibitors) for at least 6 months, (iii) aged 18 years and older, and (iv) volunteering to participate in this study. The exclusion criteria were as follows: (i) being diagnosed with major psychiatric diseases, (ii) concurrent terminal illness or being clinically unstable, and (iii) having cognitive impairment.

Ultimately, 150 patients with AS were enrolled in the study. Of those, 10 patients were omitted from the analysis because they did not complete the questionnaires appropriately. Consequently, data analyses were limited to the remaining 140 patients.

Data collection

Each patient completed a 3-part questionnaire. The first part included demographic and clinical characteristics. Demographics include patients' age, gender, educational status, marital status, working status, disease duration, and age at diagnosis. Clinical data included medications, side effects, and activity of the disease. The disease activity was determined with physician global assessment (numeric visual analog scale (nVAS; 0-10) and the Routine Assessment of Patient Index Data [RAPID]-3 score) (17). RAPID-3 is a patient-reported composite index, with the advantages of ease of use and implementation, useful for many rheumatologic conditions. In our previous study, we found a good correlation between the RAPID-3 and both the disease activity indices (Ankylosing Spondylitis Disease Activity Score and Bath Ankylosing Spondylitis Disease Activity Index) specific for AS (17).

The second part of the questionnaire included questions about CAM usage, and if any CAM use was reported, the referral pattern as well as the outcome of CAM was questioned. In determining the types of complementary health approaches, the National Center for Complementary and Integrative Health website was used (7). The third part of the questionnaire included questions about treatment adherence and beliefs about medicines of patients.

Patients' adherence to the drug therapy was assessed with the Morisky Green Levine Medication Adherence Scale (MGLS) (18). This scale consists of 4 items. Each item is designed to evaluate whether the patients exhibit a specific type of nonadherent behavior. For each item, "yes" and "no" answers are scored as 1 and 0, respectively. The MGLS results in a score ranging from 0 to 4. For this study, patients with an MGLS score of 0 were classified as compatible and those with a score ≥ 1 were classified incompatible (19).

The Beliefs about Medicines Questionnaire (BMQ-T), which was validated by Cinar et al. (20) in a Turkish population, was used to assess patients' perceptions and expectations about medications. The original BMQ was developed by Horne et al. (21). It consists of 2 sections: general and specific. Each section contains 2 subscales. The BMQ-General includes general harm and general overuse subscales, and each consists of 4 items. The BMQ-Specific includes BMQ-Necessity and BMQ-Concerns subscales, and each consists of 5 items. The BMQ-Necessity scale assesses the patients' beliefs about the necessity of prescribed medication for controlling their disease, whereas the BMQ-Concerns scale assesses their concerns about potential adverse events of taking it. Participants indicate the degree of participation in each statement on a 5-point Likert scale ranging from strongly disagree [1] to strongly agree [5]. An average score for each subscale is calculated by dividing the total score for these scales by the number of items in the scale, and a mean score range of 1-5 is obtained for each subscale. The higher scores of each section indicate stronger belief in the concept of that section (20, 21).

Procedure

The data were collected by face-to-face interviews after written informed consent was obtained. Interviews were conducted in outpatient rooms. The interviews took a mean of 15-20 minutes.

Statistical analysis

Statistical analyses were performed using the IBM Statistical Package for Social Sciences for Windows, Version 24.0 (IBM SPSS Corp; Armonk, NY, USA). The participants were evaluated in 2 groups: CAM users and non-CAM users. Those who reported using at least 1 CAM method in the present or past were defined as CAM users. The sociodemographic and clinical characteristics of those who used CAM and who were not using CAM were compared. The continuous variables were expressed as mean $\pm$ standard deviation (if normally distributed) and median [interquartile range (IQR) (Q1-Q3)] (if not normally distributed), and categorical vari-

Main Points

- Regardless of the level of education, disease activity, drugs used, medication adherence, and patients' beliefs about medicines, we can say that there is a high complementary and alternative medicine (CAM) usage in patients with ankylosing spondylitis (AS).
- The use of natural products, massage therapy, and spa relaxation techniques in patients with AS are the foremost CAM modalities.
- It is essential for health professionals to discuss the treatment options with patients and to monitor the ongoing medical-treatment-response changes during CAM usage.

ables were expressed as numbers and percentages. The compatibility of the continuous data with a normal distribution was examined using the Shapiro-Wilk test. Comparisons between the groups were assessed using the independent samples *t* test, Mann-Whitney U test, and Pearson's chi-square test. For all the analyses,

$p < 0.05$ was considered to be statistically significant.

Results

The mean age of patients (90.7% male) was 37.2 ± 8.9 years, the median disease duration was 6.6 years (IQR, 4.57-11.67), and the mean age at

diagnosis was 29.5 ± 8.3 years. Current or previous CAM usage was reported by 40% of patients ($n=56$). It was found that using at least 1 CAM method was significantly better in patients who were older ($t=2.006$, $p=0.047$), married ($\chi^2=11.607$, $p=0.001$), and had been diagnosed at an older age ($t=2.128$, $p=0.035$) (Table 1).

Table 1. Comparison of sociodemographic and clinical characteristics of patients according to CAM use ($n=140$).

Characteristics	Overall ($n=140$)	CAM users ($n=56$)	Non-CAM users ($n=84$)	Statistics	p
Age (years)*	37.2 ± 8.9	39.1 ± 8.9	36.0 ± 8.77	2.006 ^a	0.047
Gender**					
Male, n (%)	127 (90.7)	49 (87.5)	78 (92.9)	1.145 ^b	0.285
Female, n (%)	13 (9.3)	7 (12.5)	6 (7.1)		
Educational status**					
Primary school, n (%)	14 (10)	4 (7.1)	10 (11.9)	0.952 ^b	0.621
High school, n (%)	21 (15)	8 (14.3)	13 (15.5)		
University and over, n (%)	105 (75)	44 (78.6)	61 (72.6)		
Marital status**					
Married, n (%)	101 (72.1)	50 (87.7)	51 (61.4)	11.607 ^b	0.001
Single, n (%)	39 (27.9)	7 (12.3)	32 (38.6)		
Working status**					
Employed, n (%)	111 (79.3)	46 (82.1)	65 (77.4)	0.464 ^b	0.496
Unemployed, n (%)	29 (20.7)	10 (17.9)	19 (22.6)		
Disease duration*** (years)	6.60 (4.57-11.67)	7.02 (4.16-12.43)	6.60 (4.80-11.67)	-0.287 ^c	0.774
Age of diagnosis* (years)	29.5 ± 8.3	31.3 ± 7.8	28.3 ± 8.5	2.128 ^a	0.035
Physician global assessment*** (0-10 VAS)	2.50 (1.0-4.5)	2.25 (1.0-4.5)	2.50 (1.0-4.5)	-0.079 ^c	0.937
Patient global assessment*** (0-10 VAS)	5.0 (2.5-7.0)	5.0 (3.0-6.5)	5.0 (2.13-7.0)	-0.375 ^c	0.707
Spinal pain*** (0-10 VAS)	4.5 (2.5-7.0)	4.5 (2.5-6.38)	4.25 (2.5-7.0)	-0.471 ^c	0.638
Experiencing drug-related adverse events**					
Yes, n (%)	38 (27.1)	14 (25.0)	24 (28.6)	0.217 ^b	0.642
No, n (%)	102 (72.9)	42 (75.0)	60 (71.4)		
RAPID-3 score*	11.2 ± 6.1	10.8 ± 5.4	11.5 ± 6.6	-0.713 ^a	0.477
RAPID-3**					
Remission, n (%)	17 (12.1)	6 (10.7)	11 (13.1)	0.978 ^b	0.807
Low severity, n (%)	11 (7.9)	4 (7.1)	7 (8.3)		
Moderate severity, n (%)	58 (41.4)	26 (46.4)	32 (38.1)		
High severity, n (%)	54 (38.6)	20 (35.7)	34 (40.5)		

*Mean $\pm$ SD.

**n (%).

***median (interquartile range, Q1-Q3).

^aIndependent samples *t* test.

^bPearson's chi-square test.

^cMann-Whitney U test.

CAM: complementary and alternative medicine; RAPID: Routine Assessment of Patient Index Data; SD: standard deviation; VAS: visual analog scale.

Table 2. Prevalence and type of used CAM modalities (n=56).

Used CAM modality	Total, n (%)	Finding useful				Side effect, n	Current use (n=26) ^a , n (%)
		Much, n	Some, n	No, n	No idea, n		
Natural products	40 (71.4)	10	17	8	5	1	13 (23.2)
Massage therapy	17 (30.3)	2	9	4	2	1	3 (5.3)
Spa relaxation techniques	11 (19.6)	2	5	4	-	2	3 (5.3)
Praying/spiritual approach	9 (16.1)	4	3	1	1	-	7 (12.5)
Cupping	6 (10.7)	1	1	4	-	-	2 (3.5)
Imagining	3 (5.3)	2	1	-	-	-	3 (5.3)
Naturopathy	3 (5.3)	1	2	-	-	-	2 (3.5)
Acupuncture	2 (3.5)	-	-	1	1	-	-
Yoga	1 (1.7)	-	1	-	-	-	1 (1.7)

^aThe number of patients indicated that they have used CAM modalities. Patients marked more than 1 method.
CAM: complementary and alternative medicine.

Table 3. Reasons for patients to use/withdraw CAM (n=56).

Reasons for using CAM	n (%) ^a
I thought it might be useful	41 (73.2)
I used it because I believed that it would help to fight/heal/and/or defeat the disease	28 (50.0)
I used it to relieve my pain	20 (39.2)
I used it for not getting worse	19 (33.9)
I used it because other users were satisfied	14 (25.0)
I used it because I have no other choice	5 (8.9)
I used it because I was curious	5 (8.9)
I used it because doctors did not give enough time during my examinations	2 (3.6)
I used it because I think the medicine the doctor gave me was insufficient	2 (3.6)
Information resources for CAM	
Media (television, radio, newspaper and magazine, and internet)	20 (39.2)
Other patients with the same disease	15 (26.7)
My family and relatives	14 (25.0)
Neighbors and friends	13 (23.2)
Healthcare professionals	7 (12.5)
Reasons for withdrawal of alternative therapy	
Not seeing any benefit	5 (8.9)
Transportation difficulties (for those who use acupuncture, massage, and Spa)	3 (5.4)
Do not like tastes (for those who use herbal products)	1 (1.8)
To be afraid of interacting with medicines (for users of herbal product)	1 (1.8)
Increase of pain	1 (1.8)

^aPatients reported more than 1 answer.
CAM: complementary and alternative medicine.

A total of 93 patients (66.4%) were using at least 1 anti-TNF- α agent, and adalimumab was the most commonly used one (29.3%). Moreover, 83 (59.3%) patients were using NSAIDs, and 21.4% were using sulfasalazine. Other medicines, including colchicine, methotrexate, and glucocorticoids, were being used by a minority of the patients (each $\leq 5\%$). Drug-related adverse events were experienced by 27.1% of the patients. Among those, gastrointestinal side effects and allergic reactions were the leading ones (13.6% and 5.0%, respectively). Although not shown in the table, use of NSAIDs or anti-TNF- α agents were not significantly different between CAM users and non-users ($\chi^2=2.816$, $p=0.093$; $\chi^2=0.605$, $p=0.437$, respectively).

The frequency of CAM modalities used by the patients and degree of satisfaction from CAM modalities are shown in Table 2. Among the 56 patients who reported CAM usage, 46.4% (n=26) reported current CAM usage during the study. Among the CAM users, natural products (71.4%), massage therapies (30.3%), spa relaxation techniques (19.6%), and praying/spiritual approach (16.1%) were the most frequently preferred CAM modalities by patients. Although the data are not shown, 45 (80.4%) of 56 CAM users stated that they had experienced some degree of benefit from CAM modalities.

"Believing that it is useful" (73.2%), "believing that it will treat the disease" (50.0%), "relieving pain" (39.2%), "not getting worse" (33.9%), and "satisfaction of other users" (25.0%) have been reported as the main reasons for using CAM. Mainly reported information resources for CAM usage are media (39.2%), other patients with the same disease (26.7%), families and relatives (25.0%), neighbors and friends (23.2%), and

Table 4. Comparison of Beliefs about Medicines Questionnaire and Morisky Green Levine Medication Adherence Scale scores of patients according to the use of CAM (n=140).

Variable	Overall (n=140)	CAM users (n=56)	CAM non-users (n=84)	Test	p
BMQ-T-Specific necessity	4.0 (3.6-4.4)	4.1 (3.6-4.4)	4.0 (3.45-4.4)	-0.648 ^a	0.517
BMQ-T-Specific concerns	3.29±0.71	3.39±0.65	3.23±0.74	1.296 ^b	0.197
BMQ-T-General overuse	2.5 (2.1-3.0)	2.5 (2.25-3.0)	2.5 (2.0-3.0)	-0.745 ^a	0.456
BMQ-T-General harm	2.5 (2.0-3.0)	2.5 (2.25-3.0)	2.5 (2.0-3.0)	-1.277 ^a	0.202
	n (%)	n (%)	n (%)		
Morisky Green Levine Medication Adherence Scale					
Adherence	52 (37.1)	24 (42.9)	28 (33.3)	1.305 ^c	0.253
Nonadherence	88 (62.9)	32 (57.1)	56 (66.7)		

Data represented either as mean±SD/median (interquartile range, Q1-Q3) or as frequency.

^aMann-Whitney U test.

^bIndependent samples t test.

^cPearson's chi-square test.

CAM: complementary and alternative medicine; BMQ-T: Beliefs about Medicines Questionnaire Turkish translation.

Table 5. Comparison of Beliefs about Medicines Questionnaire scores of patients according to adherence to treatment (n=140).

Variable	Adherence (n=52)	Nonadherence (n=88)	Test	p
BMQ-T-Specific necessity	4.2 (3.65-4.6)	3.8 (3.4-4.2)	-2.326 ^a	0.020
BMQ-T-Specific concerns	3.13±0.73	3.39±0.68	-2.165 ^b	0.032
BMQ-T-General overuse	2.25 (2.0-3.25)	2.75 (2.25-3.25)	-3.298 ^a	0.001
BMQ-T-General harm	2.25 (2.0-2.75)	2.5 (2.25-3.0)	-2.556 ^a	0.011

Data represented either as mean±SD or as median (interquartile range, Q1-Q3).

^aMann-Whitney U test.

^bIndependent samples t test.

BMQ-T: Beliefs about Medicines Questionnaire Turkish translation.

healthcare professionals (12.5%). Reported reasons of abandoning CAM are "having no benefit" in 5 patients (8.9%) and "having difficulty to obtain CAM methods such as acupuncture, massage and spa relaxation techniques" in 3 patients (5.4%) (Table 3).

There was no statistically significant difference between the CAM users and non-users regarding patients' beliefs about medicines and treatment adherence ($p>0.05$) (Table 4).

When BMQ-T scores were compared with respect to adherence to the treatment, it was found that specific necessity scores were significantly higher in compliant patients ($p=0.020$); in contrast, specific concerns, general overuse, and general harm scores were found to be higher in noncompliant patients ($p=0.032$, 0.001 , and 0.011 , respectively) (Table 5).

Discussion

This study showed that nearly half of the patients with AS (40%) reported using at least 1

CAM modality despite availability of new treatment options. Remarkably, the CAM usage was significantly higher in patients who were married, older, and were diagnosed at older ages. Our results also indicate that patients' beliefs about medicines and treatment adherence were not significantly differed by CAM usage. However, there is a high belief in the necessity of prescribed medicines (specific necessity) in treatment-compliant patients. In contrast, in patients who are noncompliant, the concerns about the possible side effects of the prescribed medicines (specific concerns), the beliefs of the physicians, overuse of the medicines (general overuse), and the belief that the medicines are harmful (general harm) are high. This was the most striking finding that patients' beliefs about medicines affect treatment adherence.

Although there are many studies in the literature evaluating the use of CAM in rheumatologic conditions, only a few of them have stud-

ied CAM usage in patients with AS (3, 5, 11). In a study on patients with AS in Australia, 94.7% of the patients reported previous or current CAM usage, and 82.7% of patients were found to use CAM during the study (3). Another study that investigated the incidence and causes of CAM usage in patients with rheumatic diseases in Turkey found that 28.7% of the patients with AS used CAM modalities and that the frequency of CAM usage was correlated with increased disease activity (5). In this study, 40% of the patients reported CAM usage. Although this rate is slightly higher than that reported in the previously conducted study in Turkey, it is quite lower than that reported by Chatfield et al. (3). As stated by Solak et al. (5), high disease activity may be a reason for the use of CAM, but as seen in our study, disease activity was not different between CAM users and non-users. These results show the universal use of CAM methods. This wide range of CAM usage in studies from different countries may be related to cultural differences, beliefs of patients, availability of CAM providers, advertisements in the lay press, characteristics of folk medicine, and popular CAM treatments or methodologies used in these studies.

When the use of CAM in rheumatic diseases is examined, the percentage of patients with rheumatic diseases reporting any CAM method varies from 22% to 95% in different studies (3, 9, 22). In general, the most commonly preferred CAM modalities by patients with rheumatic diseases are natural products and mind-body therapies (3, 23). It has been determined that the most frequently preferred CAM modalities in our country are herbal products, nutritional changes, and body-based methods (23, 24). Similar to other studies, the most commonly preferred CAM modality in this study was natural products. This may be because herbal products are cost effective and easily accessible and available or because of patients' belief that natural products are safe because of their "naturalness" as stated in the study by Tokem et al. (23).

The usage of CAM in rheumatic diseases appears to be influenced by various factors. The primary cause of CAM usage in patients with arthritis, such as rheumatoid arthritis and AS, is to relieve pain (25-27). There are also several other reasons for the use of CAM modalities, which were brought up by patients, such as (i) they are more natural than pharmacological treatments, (ii) to give it a try, (iii) supposedly having lesser side effects than pharmacological treatments, and (iv) patients' negative perceptions about the efficacy of pharmacological treatments (23). In the qualitative study of

Rose titled "Why do patients with rheumatoid arthritis use complementary therapies?," dissatisfaction from conventional treatment, worry about side effects, and drug ineffectiveness were the leading reasons for using CAM (28). In our study, believing that it is useful (73.2%), believing that it will treat the disease (50.0%), relieving pain (39.2%), not getting worse (33.9%), and satisfaction of other users (25.0%) have been reported as the main reasons for using CAM. In a study conducted on CAM practitioners, Family et al. (11) emphasized that the benefits of CAM on providing effective symptom management are high when used in conjunction but not when used as an alternative to mainstream healthcare. Although it was not asked in detail whether CAM was used alone or in combination with medical treatments in our study, 45 (80.4%) of 56 CAM users stated that they had some benefit from CAM methods.

In this study, we found that patients were influenced by media, other patients with the same disease, or family/relatives, regarding CAM usage. Similarly, in previous studies, it was found that patients' decision to use CAM was affected by friends, family, and media, such as newspaper, journal, television, and internet (23, 24, 29). Therefore, it is possible that the use of CAM is mostly influenced by positive opinions and recommendations about CAM methods by the users. Although previous studies suggested that the decision of CAM usage might be affected by patients' concerns about side effects of drug treatment, our study does not support previous studies because we found that the patients' beliefs about medicines was not a determinant of CAM usage.

On the basis of their beliefs or experiences, patients may have individual perspectives about a single drug and make decisions about it (30). Similarly, the success of the treatment depends on the individual treatment tolerability, but it is also greatly affected by the patient's compliance. According to the WHO, almost 50% of patients are compatible with chronic drug treatment (31). In our study, we found that only 37.1% of patients with AS adhere to their prescribed drugs. In a systematic review on selected rheumatic conditions, the reported drug compliance rates were between 30% and 99% (32). In the study by Zhang et al., (33) the medication adherence rate of patients with AS was 31.1%. Another study of patients with AS in Turkey found that the medication adherence rate was 36.1% (34). These results show that compliance with treatment in patients with AS is low. There are different reasons for noncompliance with treatment. In another study, the patients' own encouragement with respect to any therapy has been reported

to have an effect on compliance, which was defined as the balance between the patients' opinions about the requirement of the treatment and their worries about its adverse effects (35). Similarly, in this study, patients who are in compliance with treatment are more likely to believe the necessity of prescribed drugs, whereas those who are incompatible had more concerns about the possible side effects of prescribed drugs and had greater belief in the overuse of drugs.

The most important limitation of this study was that it was based on a patient-reported survey. Expected weaknesses of these studies including remembering issues, such as recall bias and incorrect statements of patients, may cause potential risk of bias.

In conclusion, this study showed that approximately half of the patients with AS were using one of the CAM methods, despite development of new and effective agents for treatment of AS. Moreover, it showed that medication adherence and patients' beliefs about medicines did not have any impact on CAM usage but the patients' beliefs about medicines affected the treatment adherence. Healthcare professionals in the field of rheumatology should be aware of CAM usage and consult their patients about any potential negative or positive effect of CAM on their ongoing medical treatment.

Ethics Committee Approval: Ethics committee approval was received for this study from the Gülhane Military Medical Academy (Approval Date: February 12, 2014; Approval Number: 50687469-1491-202-14/1648.4-366).

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