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# Does Spondylarthropathy Cause an Increase in Irritable Bowel Syndrome?

## Spondilartropatiler İrritabl Bağırsak Sendromunda Artışa Neden Olur Mu?

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## ABSTRACT

**Objectives:** The objectives were to determine the prevalence of IBS and gastrointestinal symptoms in people with psoriatic arthritis (PsA) and ankylosing spondylitis (AS), as well as to investigate the effects of eating habits, sleep disturbances, and depression on gastrointestinal symptoms.

**Methods:** The study included AS and PsA cases and also an age- and gender-matched control group for comparison. Demographic information was recorded, and disease activity was evaluated. All patients were asked about their IBS symptoms using the ROME III criteria and the Irritable Bowel Syndrome Quality of Life questionnaire. The Gastrointestinal Symptom Rating Scale, Beck Depression Inventory, Pittsburgh Sleep Quality Index, and Attitude Scale for Healthy Nutrition were also used.

**Results:** There was no statistically significant difference between the groups in terms of the frequency of IBS and gastrointestinal symptoms. Regarding the Beck Depression Inventory and the Attitude Scale for Healthy Nutrition, there was no statistically significant difference between the groups. In group analyses, there was no connection between IBS and gastrointestinal symptoms and the existence of depression, eating habits, or sleep disturbances.

**Conclusion:** There was no increase in the frequency of IBS and gastrointestinal symptoms in AS and PsA. Additionally, we found no correlation between sleep disturbances, eating habits, and depression scores in AS and PsA patients.

**Keywords:** Ankylosing spondylitis; Irritable bowel syndrome; Psoriatic arthritis.

## ÖZET

**Amaç:** Psoriatik Artrit (PsA) ve Ankilozan Spondilit (AS) hastalarında IBS ve gastrointestinal semptomların sıklığını belirlemek ve ayrıca yeme alışkanlıkları, uyku bozukluğu ve depresyonun gastrointestinal semptomlar üzerindeki etkilerini araştırmaktır.

**Yöntem:** Çalışmaya AS ve PsA olguları ile bu hasta grubuna yaş ve cinsiyet olarak uyumlu kontrol grubu dahil edildi. Hastaların demografik bilgileri kaydedildi, hastalık aktiviteleri değerlendirildi. Tüm hastalara ROME III kriterleri ve İrritabl Bağırsak Sendromu Yaşam Kalitesi anketi kullanılarak IBS semptomları sorgulandı. Gastrointestinal Semptom Derecelendirme Ölçeği, Beck Depresyon Envanteri, Pittsburgh Uyku Kalitesi İndeksi ve Sağlıklı Beslenmeye Yönelik Tutum Ölçeği de kullanıldı.

**Bulgular:** IBS sıklığı ve gastrointestinal semptomlar açısından gruplar arasında istatistiksel olarak anlamlı fark yoktu. Beck Depresyon Envanteri ve Sağlıklı Beslenmeye Yönelik Tutum Ölçeği açısından gruplar arasında istatistiksel olarak anlamlı bir fark yoktu. Grup analizlerinde, IBS ile gastrointestinal semptomlar ve depresyon, yeme alışkanlıkları veya uyku bozukluklarının varlığı arasında herhangi bir bağlantı bulunamadı.

**Sonuç:** AS ve PsA'da IBS ve gastrointestinal semptomların sıklığında artış görülmedi. Ayrıca AS ve PsA hastalarında uyku bozukluğu, yeme alışkanlıkları ve depresyon skorları arasında korelasyon bulunamadı.

**Anahtar sözcükler:** Ankilozan spondilit; Huzursuz barsak sendromu; Psoriatik artrit.

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Irritable bowel syndrome (IBS), a well-known functional gastrointestinal illness, is defined by stomach pain, bloating, or discomfort that occurs in conjunction with abnormal bowel habits without biological causes that may be identified with conventional tests.[1] It is known that the relation between spondyloarthritis and inflammatory bowel disease (IBD) is well established; axial spondyloarthritis (axSpA) individuals with I BD account for 5% to 10% of all cases. Moreover, between 50% and 60% have microscopic gut inflammation.[2] Yet, more than 50% of Ankylosing Spondylitis (AS) patients report experiencing frequent abdominal pain or diarrhea.[3] What causes these increased gastrointestinal symptoms is a question mark, and it has been the subject of our research.

According to certain research, those who have AS are more prone to experience the symptoms of IBS.[4] The ratio of gut symptoms meeting IBS criteria was found to be %30 in axSpA and %10 in controls in a study, which is accepted as statistically significant.[5] In another population-based cohort study conducted across Taiwan, it is stated that patients with AS are more likely to develop IBS than their non-AS counterparts.[6] According to some perspectives, these problems may be caused by NSAID (Non-Steroidal Anti-Inflammatory Drugs) use in AS patients.[7] A different study, nevertheless, discovered that IBS symptoms were less frequent in AS patients using NSAIDs.[8]

We only found one retrospective study in PsA (Psoriatic Arthritis), despite the fact that there are numerous studies demonstrating a connection between IBS and AS cases.[9] There is, however, no additional research to support and confirm the relationship between these two conditions.

IBS places a major burden on patients and employers because it is linked to significantly worse health-related quality of life, more impairments in daily life and at work, and higher indirect costs.[10] Diagnosis of IBS, which is stated to be increased in SpA patients in studies, and the presence of related factors will allow the treatment of the disease.

The aim of our study is to investigate the frequency of IBS symptoms and gastrointestinal symptoms in patients with AS, PsA, and control groups, and also to determine the relationship between possible factors such as sleep disturbance, eating habits, and presence of depression with gastrointestinal symptoms.

## Methods

### Compliance with Ethical Standards

The study was approved by the Clinical Research Ethics Committee (approval number: HNEAH-KAEK 2021/295, approval date: 27.12.2021), and all the patients who took part in it provided their written consent. The research was conducted in accordance with the Helsinki Declaration.

### Study Design

The study population consisted of patients diagnosed as AS and PsA according to ASAS (Assessment in Spondyloarthritis International Society) and CASPAR (Classification criteria for Psoriatic Arthritis) criteria, respectively. Patients having no rheumatologic diseases served as the control group. Individuals with previously diagnosed gastrointestinal conditions, co-existing rheumatological diseases, cancer, and psychiatric conditions that preclude participation in the trial were excluded. Patients' demographics, clinical, and laboratory data were recorded. All patients were asked about their IBS symptoms using the ROME III criteria and Irritable Bowel Syndrome Quality of Life (IBS-QOL) questionnaire. The Gastrointestinal Symptom Rating Scale (GSRS), Beck Depression Inventory (BDI), Pittsburgh Sleep Quality Index (PSQI), and Attitude Scale for Healthy Nutrition (ASHN) were also used. BASDAI (Bath Ankylosing Spondylitis Disease Activity Index) and PSAID 9 (Psoriatic Arthritis Impact of Disease 9) were used to evaluate the disease activity in AS and PsA patients, respectively.

### Rome III Criteria

IBS symptoms were questioned based on the Rome III Criteria, which was created in 2006 to differentiate IBS from organic disorders and to standardize diagnosis. Turkish validity and reliability of Rome III criteria was taken in 2014.[11]

### Irritable Bowel Syndrome-Related Health Quality Life Scale

The assessment of health-related quality of life (HRQoL) is significant as an outcome measure for individuals with IBS, as it offers a comprehensive evaluation of the patient's emotional, social, and physical functions.[12] It was first developed in 1997 by Patrick and Drossman. Turkish validity and reliability was performed by Ozgursoy in 2010.[13,14]

The IBS-QOL scale consists of 34 items and 8 subgroups: Dysphoria (8 items), Prevention of Activities (7 items), Body

Image (4 items), Health Worries (3 items), Food Avoidance (3 items), Social Reaction (4 items), Sexual (2 items), Social Relationship. Each question on the Likert scale has 5 possible answers. Each individual case was asked to choose one of the options listed below: "1: Not at all," "2: Slightly," "3: Moderately," "4: Quite a bit", "5: A great deal/Extremely". [14] While the lowest score is 34, the highest score is 170. The increase in the total score of the scale indicates an increase in the disease-related quality of life of individuals.

### Gastrointestinal Symptom Rating Scale:

Gastrointestinal symptoms, clinical experiences, and opinions were all taken into consideration when Revicki, Wood, Wiklund, and Crawley (1998) created the Gastrointestinal Symptom Rating Scale (GSRS). The 15-question GSRS uses a seven-point Likert scale, with responses ranging from "no problem" to "severe discomfort." The GSRS contains five subdimensions based on factor analysis: diarrhea, indigestion, constipation, abdominal pain, and reflux. With the GSRS, the patient is asked how they feel about their GI issues from the previous week. The severity of the symptoms increases as the scores rise.[15] Turkish reliability and validity was taken in 2017 by Turan and colleagues.[4,6,7,16]

### Attitude Scale for Healthy Nutrition:

The scale measuring the attitudes towards healthy nutrition is a valid and reliable tool. For each topic on the scale consisting of 21 questions, there are answer possibilities such as "I strongly disagree," "I do not agree," "I am undecided," "I agree," "I strongly agree." The lowest score that can be gained using the scale is 21, while the greatest score is 105. Scores of 23–42 indicate low, 43–63 medium, 64–84 high, and 85–110 ideal attitudes towards healthy eating, describing how one has a highly positive attitude about healthy eating.[17]

### Statistical Analysis

Behaviors of quantitative variables were expressed using centralization and measures of variance: Mean±SD. The chi-square test or, alternatively, the Fisher Exact Test (where the sample size was low) was used to identify differences in ratios or relationships between categorical variables. To show the behavioral differences of the group averages, ANOVA T-Test (number of groups>2) and Student T-Test (number of groups=2) were used when the assumptions of normality and homogeneity were met, and Kruskal-Wallis H-Test (number of groups>2) and Mann-Whitney U-Test were used when they were not (number of groups=2). Bonferroni post hoc correction method was used for multiple comparisons between groups. The non-parametric Spearman's Rank Correlation test was used to calculate the correlation between two numerical variables, as the data did not have a normal distribution. Statistical significance was determined as p=0.05 for all cases. Statistical analyses were provided with the IBM SPSS (Statistics Package for Social Sciences for Windows, Version 21.0, Armonk, NY, IBM Corp.) package program.

## Results

A total of 53 individuals with AS, 41 individuals with PsA, and 47 individuals in the control group constituted the study groups. The demographic information for the groups showed uniform distribution, with the exception of gender, weight, and smoking status (Table 1). Mean±SD of BASDAI scores in AS and PSAID-9 scores in PsA were 3.12±1.87 and 5.38±2.05, respectively. Usage of NSAIDs was higher in AS patients. A total of 45.3% of AS patients and 39% of PsA patients were using TNF inhibitors. IBS frequency and IBS-QOL total and 8 subgroup scores didn't differ between groups (p=0.692 and p=0.055). Also, no difference was found between the groups in terms of GSRS total and 5 subgroup scores (Table 2). BDI, sleep quality, and attitudes toward healthy nutrition didn't differ between groups (Table 3).

In group analysis of AS patients with and without IBS, there were no statistically significant differences or correlations in terms of depression, sleep quality, and attitudes toward healthy nutrition. Age, gender, smoking, alcohol consumption, use of PPIs and NSAIDs, having diabetes mellitus, and BASDAI scores did not differ between AS patients with and without IBS.

In group analysis of PsA patients with and without IBS, there were no statistically significant differences or correlations in terms of depression, sleep quality, and attitudes toward healthy nutrition. There was a statistically significant difference only in sleep disturbance, a sub-component of PSQI (p=0.033), and PSAID-9 (p=0.046). Sleep disturbance scores were higher in patients with IBS (the scores of patients with and without IBS were 1.65±0.81 and 1.03±0.72, respectively). PSAID-9 scores were higher in patients with IBS (PSAID-9 score in IBS patients was 6.43±1.65 versus 5.02±2.07). Age, gender, smoking, alcohol consumption, use of PPIs and NSAIDs, and having diabetes mellitus did not differ between PsA patients with and without IBS.

**Table 1. Distribution of demographic variables**

| Group | AS (53) | PsA (41) | Control (47) | p |
|---|---|---|---|---|
| Gender | | | | |
| Male | 32 (60.4%) | 13 (31.7%) | 18 (38.3%) | 0.012* |
| Female | 21 (39.6%) | 28 (68.3%) | 29 (61.7%) | |
| Age | 45.64±10.45 | 49.12±12.27 | 42.19±14.14 | 0.073(k) |
| | 45 (25-68) | 48 (27-77) | 44 (20-74) | |
| Height | 168.81±8.54 | 164.63±9.28 | 166.72±8.85 | 0.053(k) |
| | 168 (154-189) | 164 (150-198) | 165 (150-183) | |
| Weight | 76.45±13.14 | 77.34±14.17 | 70.91±12.75 | 0.046(a) |
| | 77 (46-109) | 80 (52-111) | 70 (45-107) | |
| BMI | 26.79±4.02 | 28.65±5.51 | 25.52±4.26 | 0.007 (a) |
| | 26.78 (17.31-35.84) | 28.52 (19.82-43.91) | 24.69 (17.97-34.6) | |
| Smoking (package/year) | 4.5±8.04 | 7.11±10.2 | 2.51±6.2 | 0.026(k) |
| | 0 (0-35) | 0 (0-36) | 0 (0-27) | |
| Alcohol use | | | | |
| Yes | 5 (9.4%) | 8 (20.0%) | 5 (10.6%) | 0.275* |
| No | 48 (90.6%) | 32 (80.0%) | 42 (89.4%) | |

Stats: Mean±SD/Median (Min–Max); (a) Anova F-test - (k) Kruskal Wallis Test; p* Pearson Chi-Squared Test; AS:Ankylosing Spondylitis PsA: Psoriatic Arthritis; BMI: Body Mass Index.

**Table 2. Distribution of IBS and Gastrointestinal symptoms among groups**

| Groups | As | Psa | Control | p |
|---|---|---|---|---|
| IBS | | | | |
| Yes | 12 (22.6%) | 11 (26.8%) | 9 (19.1%) | 0.692* |
| No | 41 (77.4%) | 30 (73.2%) | 38 (80.9%) | |
| IBS related QOL | 44.83±16.52 | 55.22±28.27 | 45.51±20.56 | 0.055(k) |
| | 36 (34-91) | 44 (34-140) | 34 (34-127) | |
| GSRS | 28.34±13.78 | 30.47±15.21 | 33.39±15.22 | 0.321(k) |
| | 25 (15-68) | 26 (15-64) | 34 (15-71) | |
| Indigestion | 8.98±5.94 | 8.68±5.06 | 9.05±5.31 | 0.955(k) |
| | 7 (4-36) | 7 (4-21) | 7 (4-21) | |
| Diarrhea | 4.83±2.82 | 4.91±2.82 | 6.2±4.55 | 0.508(k) |
| | 4 (3-14) | 3 (3-14) | 4 (3-19) | |
| Constipation | 5.79±3.48 | 6.47±4.53 | 7.05±4.76 | 0.661(k) |
| | 5 (3-16) | 5 (3-19) | 5 (3-21) | |
| Abdominal Pain | 5.15±2.74 | 5.85±3.3 | 6.12±3.58 | 0.443(k) |
| | 4 (3-13) | 5 (3-14) | 5 (3-16) | |
| Reflux | 3.66±2.29 | 4.55±2.97 | 4.98±3.13 | 0.071(k) |
| | 2 (2-10) | 3 (2-11) | 4 (2-14) | |

Stats: n (%); p* Pearson Chi-Squared Test; Mean±SD/Median (Min–Max); (k) Kruskal Wallis Test; AS: Ankylosing Spondylitis; PsA: Psoriatic Arthritis; IBS: Irritable Bowel Syndrome; IBS related QOL: Irritable Bowel Syndrome related Quality of Life; GSRS: Gastrointestinal System Rating Scale.

In group analysis of controls, there were no statistically significant differences or correlations in terms of depression, sleep quality, and attitudes toward healthy nutrition. There was a statistically significant difference only in daytime dysfunction, a sub-component of PSQI (p=0.043). Age, gender, smoking, alcohol consumption, use of PPIs (proton pump inhibitor) and NSAIDs, and having diabetes mellitus did not differ between controls with and without IBS (Tables 4, 5).

Table 3. Distribution Depression, Sleep Quality and Attitudes of Healthy Nutrition among groups

| Groups | AS (53) | Control (47) | PsA (41) | p |
|---|---|---|---|---|
| BDI | 6.88±9.62 | 9.51±9.05 | 8.07±9.0 | 0.149(k) |
| | 2 (0-34) | 8 (0-35) | 4 (0-27) | |
| PSQI (global) | 4.58±3.91 | 6.47±4.24 | 5.85 ±4.01 | 0.024(k) |
| | 4 (0-20) | 6 (0-16) | 6 (0-17) | |
| PSQI sleep quality | 1.13±0.86 | 1.28±0.9 | 1.22±0.96 | 0.763(k) |
| | 1 (0-3) | 1 (0-3) | 1 (0-3) | |
| PSQI sleep onset latency | 0.92±1.03 | 1.53±1.14 | 1.37±1.18 | 0.021(k) |
| | 1 (0-3) | 1 (0-3) | 1 (0-3) | |
| PSQI sleep duration | 0.53±0.87 | 0.89±1.05 | 0.73±0.92 | 0.134(k) |
| | 0 (0-3) | 1 (0-5) | 1 (0-3) | |
| PSQI sleep efficiency | 0.25±0.7 | 0.45±0.85 | 0.29±0.68 | 0.303(k) |
| | 0 (0-3) | 0 (0-3) | 0 (0-3) | |
| PSQI sleep disturbance | 1.04±0.78 | 1.32±0.81 | 1.2±0.78 | 0.234(k) |
| | 0 (0-3) | 1 (0-3) | 1 (0-3) | |
| PSQI hypnotic drugs | 0.15±0.57 | 0.06±0.44 | 0.22±0.72 | 0.325(k) |
| | 0 (0-3) | 0 (0-3) | 0 (0-3) | |
| PSQI daytime dysfunction | 0.55±0.8 | 0.94±0.96 | 0.85±0.91 | 0.07(k) |
| | 0 (0-3) | 1 (0-3) | 1 (0-3) | |
| ASHN | 66.02±9.36 | 66.3±7.53 | 64.78±10.94 | 0.775(k) |
| | 69 (39-81) | 67 (48-82) | 65 (39-85) | |

Stats: Mean±SD/Median (Min–Max); (k) Kruskal Wallis Test; AS: Ankylosing Spondylitis; PsA: Psoriatic Arthritis; BDI: Beck Depression Inventory; PSQI: Pitsburgh Sleep Quality Index; Attitudes Scale for Healthy Nutrition.

## Discussion

There was no increase in the frequency of IBS and gastrointestinal symptoms in AS and PsA. Also, we found no correlation between sleep disturbance, healthy eating habits, and depression scores in the AS and PsA patient groups, and the presence of gastrointestinal symptoms, IBS, and IBS-related quality of life scale scores.

Uveitis, psoriasis, and IBD are examples of extra-articular manifestations that are frequently seen alongside SpA and are actually included in the SpA classification criteria. Of these signs, bowel involvement appears to be the most prevalent. A total of 6%–14% of AS patients exhibit clinically apparent IBD, which is substantially more frequent than in the overall population. Additionally, it appears that 60% of AS patients exhibit silent microscopic intestinal inflammation.[18]

Although IBD is a well-known comorbidity in axSpA, less is known regarding functional bowel problems, such as IBS, in these patients. There are a few studies indicating that the frequency of IBS is increased in SpAs. In one of them, IBS symptoms were found to be significantly more prevalent than those reported for the general population in axSpA patients without known IBD, impacting over one-third of patients, and were associated with worse patient-reported outcomes regarding disease activity and health-related quality of life.[19] In another study, a prevalence of 30% for gastrointestinal symptoms meeting IBS criteria was found among axSpA patients without known IBD, which is double the incidence of matched controls and four times higher than estimates for concomitant IBD.[5] According to a population-based cohort study conducted across Taiwan, patients with AS are more likely to develop IBS than their non-AS counterparts.[6] In a study by Wang and colleagues, 60 (39.2%) of the 153 AS patients showed symptoms of functional bowel disorder, which was greater than the incidence in controls (23.2%).[8] Also, a relative association between IBS and PsA (OR 1.4, p=0.05) was found in a previously reported study.[9]

In our study, however, there was no rise in the incidence of IBS in AS and PsA patients compared to the control group, in contrast to recent studies that indicated an increase in the frequency of IBS in SpA patients. There was no difference between the groups even on the gastrointestinal symptom scale, which included symptoms like diarrhea, constipation, and abdominal pain.

**Table 4. Relation between Depression, Sleep Quality and Attitudes of Healthy Nutirtion with Irritible Bowel Syndrome**

| Groups | AS | | | PsA | | | Control | | |
|---|---|---|---|---|---|---|---|---|---|
| | IBS (+) | IBS (-) | p | IBS (+) | IBS (-) | p | IBS (+) | IBS (-) | p |
| BDI | 11.08±9.25<br>12.5 (0-24) | 5.59±9.47<br>0 (0-34) | 0.067 (m) | 11.0±10.97<br>15 (0-25) | 7.0±8.11<br>4 (0-27) | 0.34 (m) | 11.89±13.61<br>8 (0-35) | 8.88±7.57<br>7.5 (0-29) | 0.869 (m) |
| PSQI (global) | 6.58±5.84<br>5 (0-20) | 4.0±3.0<br>4 (0-12) | 0.248(m) | 7.55±3.98<br>7 (1 - 12) | 5.27±3.91<br>5 (0 - 17) | 0.108(s) | 7.44±5.39<br>5 (2 - 16) | 6.24±3.98<br>6 (0 - 16) | 0.903(m) |
| PSQI sleep quality | 1.33 ±0.89<br>1 (0 - 3) | 0.95 ±0.74<br>1 (0 - 2) | 0.186(m) | 1.45 ±0.93<br>2 (0 - 3) | 1.13 ±0.97<br>1 (0 - 3) | 0.31(m) | 1.44 ±1.13<br>1 (0 - 3) | 1.24 ±0.85<br>1 (0 - 3) | 0.636(m) |
| PSQI sleep onset latency | 1.25 ±1.14<br>1 (0 - 3) | 0.83 ±1.0<br>0 (0 - 3) | 0.228(m) | 1.45±1.21<br>1 (0 - 3) | 1.33 ±1.18<br>1.5 (0 - 3) | 0.76(m) | 1.33 ±1.22<br>1 (0 - 3) | 1.58 ±1.13<br>1.5 (0 - 3) | 0.567(m) |
| PSQI sleep duration | 0.83 ±1.19<br>0 (0 - 3) | 0.44 ±0.74<br>0 (0 - 3) | 0.361(m) | 1.0±0.89<br>1 (0 - 2) | 0.63 ±0.93<br>0 (0 - 3) | 0.184(m) | 1.44 ±1.13<br>1 (0 - 3) | 0.76 ±1.0<br>0 (0 - 3) | 0.072(m) |
| PSQI sleep efficiency | 0.5 ±1.0<br>0 (0 - 3) | 0.17 ±0.59<br>0 (0 - 3) | 0.17(m) | 0.36±0.67<br>0 (0 - 2) | 0.27±0.69<br>0 (0 - 3) | 0.495(m) | 0.22 ±0.44<br>0 (0 - 1) | 0.5±0.92<br>0 (0 - 3) | 0.633(m) |
| PSQI sleep disturbance | 1.33±0.89<br>1 (0 - 3) | 0.95±0.74<br>1 (0 - 2) | 0.186(m) | 1.64±0.81<br>2 (0 - 3) | 1.03±0.72<br>1 (0 - 2) | 0.033(m) | 1.44 ±1.13<br>1 (0 - 3) | 1.29±0.73<br>1 (0 - 3) | 0.761(m) |
| PSQI hypnotic drugs | 0.42 ±1.0<br>0 (0 - 3) | 0.07±0.35<br>0 (0 - 2) | 0.164(m) | 0.36±0.92<br>0 (0 - 3) | 0.17 ±0.65<br>0 (0 - 3) | 0.304(m) | 0.0 ±0.0<br>0 (0 - 0) | 0.08 ±0.49<br>0 (0 - 3) | 0.665(m) |
| PSQI daytime dysfunction | 0.92±1.0<br>1 (0 - 3) | 0.44±0.71<br>0 (0 - 3) | 0.09(m) | 1.27±1.1<br>1 (0 - 3) | 0.7±0.79<br>0.5 (0 - 2) | 0.124(m) | 1.56 ±1.13<br>2 (0 - 3) | 0.79 ±0.87<br>1 (0 - 3) | 0.043(m) |
| ASHN | 61.42±12.08<br>66 (39 - 74) | 67.37±8.9<br>69 (50 -81) | 0.136(m) | 69.09±7.3<br>70 (59 - 81) | 63.2±11.71<br>64 (39 - 85) | 0.128(s) | 66.44±7.47<br>65 (58 -82) | 66.26±7.64<br>68.5 (48 -80) | 0.949(s) |
| Disease Activity (BASDAI/PSAID-9) | 3.9±1.96<br>3.5 (2-8.5) | 2.89±1.8<br>2.5 (0-6.7) | 0.116(m) | 6.43±1.65<br>6.26 (3.58-9.26) | 5.0±2.07<br>5.54 (1.11 - 8.58) | 0.046(s) | | | |

Stats: Mean±SD/Median (Min–Max); (m) Mann Whitney U Test - (s) Student T-test; AS: Ankylosing Spondylitis; PsA: Psoriatic Arthritis; BDI: Beck Depression Inventory; PSQI: Pitsburgh Sleep Quality Index; ASHN: Attitudes Scale for Healthy Nutrition; BASDAI: Bath Ankylosing Spondylitis Disease Activity Index; PSAID-9:Psoriatic Arthritis Impact of Disease 9.

**Table 5. IBS and Gastrointestianl symptoms among NSAID users**

| NSAID use | Yes (23) | No (71) | p |
|---|---|---|---|
| IBS | | | |
| Yes | 4 (17.4%) | 19 (82.6%) | 0.529* |
| No | 19 (26.8%) | 52 (73.2%) | |
| GSRS | 28.96±11.75<br>25 (15-47) | 31.06±15.4<br>26 (15-71) | 0.94(m) |
| Indigestion | 9.13±4.58<br>9 (4-17) | 8.97±5.98<br>7 (4-36) | 0.579(m) |
| Diarrhea | 4.91±2.52<br>4 (3-14) | 5.59±4.03<br>3 (3-19) | 0.596(m) |
| Constipation | 5.74±3.06<br>5 (3-14) | 6.54±4.4<br>5 (3-21) | 0.953(m) |
| Abdominal Pain | 5.48±2.78<br>5 (3-12) | 5.61±3.28<br>4 (3-16) | 0.974(m) |
| Reflux | 3.78±2.49<br>2 (2-9) | 4.38±2.83<br>4 (2-14) | 0.347(m) |

Stats: Mean±SD/Median (Min–Max); (m) Mann Whitney U Test; n (%) p Pearson Chi-Squared Test; NSAID: Non-Steroidal Anti-Inflammatory Drugs; IBS: Irritable Bowel Syndrome; GSRS: Gastrointestinal System Rating Scale.

Although some experts believe that microscopic colitis brought on by the use of NSAIDs may be the cause of the increased frequency of IBS and gastrointestinal symptoms in AS patients.[7] The authors in a study stated that patients on NSAIDs experienced abdominal symptoms almost twice as frequently.[5] Another study found, however, that patients with AS frequently experienced symptoms similar to FBD, IBS, and chronic diarrhea, with proportions of these symptoms being lower in those who used NSAIDs.[8] Colonoscopic examination was performed in a study in patients with AS, and the association of increased mucosal damage in the intestines of NSAID users could not be confirmed.[20] In our study, there were no patients using NSAIDs in PsA patients. Therefore, in this patient group, we are unable to determine a connection between NSAID use and IBS or other gastrointestinal symptoms, but also in AS patients, we couldn't find any significant association.

Wallman's research was questioned by Proft et al.[7] for retrospectively assessing IBS symptoms and failing to rule out

undiagnosed IBD with colonoscopy.[5] On the other hand, in a different study examining the prevalence of IBS in AS patients, patients with alarming symptoms such as unintentional weight loss, anemia, positive result of fecal occult blood, and elevated fecal calprotectin underwent a colonoscopy and IBD was ruled out. The frequency of IBS was observed to have increased as a result of this exclusion, nevertheless.[8] On the other hand, a study found that patients with IBS were more likely to experience inflammatory gut lesions such as mucosal erythema or ulceration than people in the general population.[21] Although fecal calprotectin and colonoscopy were not examined or performed in our study, it is debatable whether these tests are reliable in this patient group, the majority of whom use NSAIDs and anti-TNF.[7]

Patients reporting IBS symptoms had significantly lower health-related quality of life, visual analogue scales of global disease activity/pain/fatigue, Bath Ankylosing Spondylitis Disease Activity Index, and Bath Ankylosing Spondylitis Functional Index.[5] Disease activity as measured by PSAID-9 was statistically significantly higher in PsA patients with IBS symptoms. However, there was no significant difference between AS patients with and without IBS symptoms in terms of BASDAI scores.

Depending on how remission was defined, different IBD patients had varying prevalences of IBS-compatible symptoms. However, over 25% of patients reported similar symptoms even when strict criteria, including endoscopic or histological remission, were applied. This calls into question the idea that the root cause of these symptoms is hidden inflammation. Because of a variety of factors, including alterations to the intestinal microbiota, altered intestinal permeability, low-grade mucosal inflammation, and immunological activation, the pathophysiology behind IBS-like symptoms in IBD is likely to be complex.[22] Combining data from studies revealed that IBD patients who had IBS-like symptoms had significantly greater rates of depression and anxiety.[22,23]

An increased incidence of mood problems is found to be associated with inflammatory illnesses, including IBS and IBD.[24] Up to 94% of patients with IBS are thought to suffer from mood disorders.[25] A meta-analysis of 27 studies from East Asia, America, and Europe that included a total of 2293 IBS patients and 4951 healthy controls was published in 2017 and revealed that the prevalence of depression and anxiety is very high in IBS patients.[26] As compared to healthy controls, AS and PsA patients in our study did not have greater depression levels. In-group analyses of SpA patients did not reveal any correlation between depression and IBS levels.

There is minimal evidence that dietary factors affect the severity of AS or contribute to its etiology. There is no proof, in particular, that reducing starches, avoiding dairy products, consuming fish and fish oil, or taking probiotic supplements can lower the risk of developing AS or lessen its symptoms.[27] In addition, the ingestion of alpha-linoleic acid, carbohydrates, linoleic acid, long-chain omega-3 fatty acids, fiber, polyunsaturated fatty acids, protein, or saturated fatty acids did not correlate with disease activity or acute phase reactant levels of AS patients. No correlation existed between acute phase reactant levels and fat consumption.[28] Omega-3 and marine animal oil were evaluated for PsA in three RCTs. The investigations found no significant effects on patient global and acute phase reactants, pain, function, disease activity, tender joints, swollen joints, enthesitis, or the severity of psoriasis. One RCT found that selenium, coenzyme Q10, and vitamin E supplements had a significant impact on the severity of the disease but had no influence on the severity of psoriasis. EULAR concluded that the evidence for marine animal oil/omega-3 for PsA was rated as moderate and showed no effect on outcomes. Other dietary exposures were rated as low evidence.[28,29] We assessed the current dietary habits with a scale measuring the attitudes toward healthy nutrition and found no difference between groups. Also, we found no difference in the scores of attitudes toward healthy nutrition in patients with and without IBS in AS, PsA, and healthy controls.

The PSQI consists of seven components, and a total PSQI score of 5 or higher is a sensitive and specific indicator of poorer sleep quality. In a study, patients with AS had poorer sleep quality than healthy controls. In addition, patients with AS scored higher on the PSQI for subjective sleep quality, usage of sleep medications, sleep efficiency, and sleep latency compared to healthy controls.[30] PsA patients are also reported to have high sleep problems.[31] The PSQI scores in AS, PsA, and healthy controls in our study are 4.58±3.91, 5.88±4.01, and 6.47±4.24, respectively. PsA and healthy controls had poor sleep quality. AS patients, in contrast to the previously mentioned study, had statistically significantly better sleep quality compared to healthy controls. No difference was observed between AS, PsA, and control patients with and without IBS symptoms in the Pittsburgh Sleep Quality Index. However, sleep disturbance, which is the Pittsburgh Sleep Quality sub-parameter, was statisti-

cally significantly higher (p=0.033) in PsA patients with IBS symptoms.

Although the frequency of IBS has been previously investigated in AS patients, our study is valuable because it was conducted for the first time in PsA patients. In our study, gastrointestinal symptoms as well as IBS symptoms were evaluated on a separate scale and related factors were examined. The study's drawback is that it would be helpful to perform a colonoscopy, assess fecal calprotectin, and consult a gastroenterologist in cases where there are symptoms. The evaluation of related factors could include an objective assessment of sleep disturbances like polysomnography. Patients could also keep a food diary to monitor their eating patterns. The presence of fibromyalgia, which is often associated with IBS, could also be examined.

As a conclusion, contrary to prior research that suggested an increase in the frequency of IBS in SpA patients, there was no increase in the incidence of IBS in AS and PsA patients compared to the control group. Even on the gastrointestinal symptom scale, which covered signs like diarrhea, constipation, abdominal pain, reflux, and indigestion, there was no difference between the groups. We found no correlation between sleep disturbance, healthy eating habits, and depression scores in the AS and PsA patient groups, and the presence of gastrointestinal symptoms and IBS, and IBS-related quality of life scale scores.

### Disclosures

**Ethics Committee Approval:** This study was approved by Haydarpasa Numune Training and Research Hospital Cinical Research Ethics Committee (Date: 27.12.2021, Number: HNEAH-KAEK 2021/295).

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