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Use of the Oswestry Disability Index in ankylosing spondylitis

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SUMMARY

OBJECTIVE: The Oswestry Disability Index is considered the gold standard in the evaluation of disability in patients with chronic mechanical back pain. The aim of this study was to assess the applicability of Oswestry Disability Index in patients with ankylosing spondylitis and its relationship with disease assessment parameters for ankylosing spondylitis.

METHODS: A total of 100 patients diagnosed with ankylosing spondylitis were included in the study group. The control group consisted of 50 individuals with nonspecific low back pain. The Oswestry Disability Index and Bath Ankylosing Spondylitis Disease Activity Index were applied to both groups. In addition, the Visual Analog Scale, the Ankylosing Spondylitis Disease Activity Score C-Reactive Protein, the Ankylosing Spondylitis Disease Activity Score-the Erythrocyte Sedimentation Rate, the Bath Ankylosing Spondylitis Functional Index, Bath Ankylosing Spondylitis Metrology Index, and the Ankylosing Spondylitis Quality of Life scales were applied in the study group. the Erythrocyte Sedimentation Rate, C-Reactive Protein levels, and HLA-B27 analysis were noted as laboratory markers in ankylosing spondylitis patients.

RESULTS: The scores of Oswestry Disability Index had a significant correlation with scores of Bath Ankylosing Spondylitis Disease Activity Index in ankylosing spondylitis patients (r=0.543) and in the control group (r=0.401). There was a significant correlation between the scores of Oswestry Disability Index and the Bath Ankylosing Spondylitis Functional Index (r=0.544), Bath Ankylosing Spondylitis Metrology Index (r=0.317), the Ankylosing Spondylitis Quality of Life (r=0.723), the Ankylosing Spondylitis Disease Activity Score-the Erythrocyte Sedimentation Rate (r=0.501), the Ankylosing Spondylitis Disease Activity Score C-Reactive Protein (r=0.530), Visual Analog Scale-Rest (r=0.476), and Visual Analog Scale-Activity (r=0.441) values in patients with ankylosing spondylitis.

CONCLUSION: Evaluation of Oswestry Disability Index in conjunction with Bath Ankylosing Spondylitis Disease Activity Index may warn the physician to interpret high Bath Ankylosing Spondylitis Disease Activity Index scores in the context of mechanical pain. Therefore, the use of Oswestry Disability Index in patients with ankylosing spondylitis will be beneficial.

KEYWORDS: Spondylitis, ankylosing. Axial spondyloarthritis. Back pain. Disability evaluation. Quality of life.

INTRODUCTION

About 80% of people in the general population will have back pain in some form at some point during their lifetimes. The majority of instances of persistent back pain (97%) are reported to have a mechanical character[1]. Inflammatory back pain (IBP) and decreased spinal mobility are the two features of ankylosing spondylitis (AS)[2]. IBP is characterized by back pain that lasts for ≥3 months, develops gradually at the age of <40 years, improves with activity but does not improve with rest, occurs at night, and is accompanied by stiffness in the morning and changes in the findings of several laboratory findings[3]. Mechanical back pain (MBP), which can occur at any age but may be more common in middle-aged, working people, is more frequently caused by an acute injury or damage of an anatomical dysfunction in the lower back[1,4]. Both IBP and MBP have been linked to chronic back pain and both can occur in patients with spondyloarthropathy (SpA)[3]. According to estimates, up to 5% of patients with chronic low back pain (LBP) who visit their primary care provider have AS[2].

The Oswestry Disability Index (ODI), which was created to quantify pain and impairment in patients with chronic LBP, has emerged as the gold standard for determining the degree of disability brought on by MBP. The ODI has not yet been widely utilized for the evaluation and monitoring of AS patients. In general, a more specific AS outcome measure is the Bath Ankylosing Spondylitis Disease Activity Index (BASDAI)[5]. However, current research indicates that people with mechanical LBP have BASDAI scores comparable to those of patients with AS[6-8]. We aimed to test the applicability of ODI in patients with AS and to determine the correlation of ODI with standard assessment measurements of AS.

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METHODS

A total of 100 patients between the ages of 18 and 65 years who were diagnosed with AS based on modified New York criteria and axial SpA based on the Assessment in SpA International Society (ASAS) classification criteria were enrolled as the patient group. A total of 50 patients with nonspecific LBP, matched in age and gender, were included as the control group in the outpatient clinic of our hospital. Exclusion criteria were a history of lumbar region surgery, peripheral arthritis, the presence of a total hip replacement, and pregnancy.

The BASDAI consists of six questions concerning fatigue, spinal pain, joint pain or swelling, areas of localized tenderness, pain severity, and duration of morning stiffness, and the patients answer the questions on a 10-cm Visual Analog Scale (VAS). Lower scores indicate less active disease[5]. BASDAI's Turkish validity and reliability study was conducted in 2005[9].

A 10-cm VAS was employed to evaluate inflammatory low back discomfort in the last week, and the patients were asked to score between 0 and 10 points (0: no pain and 10: unbearable pain). VAS was questioned on rest and activity[10].

The patient's global evaluation of disease activity, the CRP (mg/L) for the Ankylosing Spondylitis Disease Activity Score-C-reactive protein (ASDAS-CRP), or the ESR (mm/h) for the Ankylosing Spondylitis Disease Activity Score-Erythrocyte Sedimentation Rate (ASDAS-ESR), were used to construct the ASDAS-ESR and ASDAS-CRP, and the scores were then calculated using the responses from questions 2, 3, and 6 on the BASDAI. The disease activity cutoffs for ASDAS are 1.3, which separates "inactive disease" from "moderate disease activity," 2.1, which separates "moderate disease activity" from "high disease activity," and 3.5, which separates "high disease activity" from "very high disease activity[11]."

In both clinical practice and clinical studies, the Bath Ankylosing Spondylitis Functional Index (BASFI) is the measurement that is most frequently utilized[12]. The BASFI index is designed so that the first eight questions concentrate on the functional anatomy of the patient with AS, and the last two questions pertain to global evaluations that assess the patient's functional capacity to manage daily life[13]. A higher score indicates a higher degree of functional limitations.

To reliably assess the axial condition of people with AS, the Bath Ankylosing Spondylitis Metrology Index (BASMI) was developed. The five clinical measures used to determine the BASMI score are the tragus-to-wall distance, lumbar flexion, cervical rotation, lumbar side flexion, and intermalleolar distance. The total score is between 0 and 10. A high score is associated with poor axial mobility[14].

The Ankylosing Spondylitis Quality of Life (ASQoL) questionnaire has 18 items with a binary "Yes/No" response format, each with a score of "1" or "0," respectively. Overall ratings varied from 0 to 18, with a higher number signifying a worse level of life quality[15].

The ODI is among the most frequently used self-reported questionnaires for assessing functional outcomes in individuals with LBP and other spinal diseases. It was designed as a clinical assessment instrument to calculate an individual'slevel of disability. The ODI just takes a few minutes to finish, and it is simple to score (1 min). The ODI is divided into 10 components that measure pain severity, personal care, lifting, walking, sitting, standing, sleeping, participating in social activities, traveling, and altering pain intensity. The ODI produces a final functional score that ranges from 0 to 100 and is decoded as follows: 0–20% as minimal disability without need for therapy; 20–40% as modest disability, requiring conservative therapy; 40–60% as serious disability, requiring further examination; 60–80% as devastating disability, requiring substantial intervention, and>80% as bedridden[16-18].

Statistical analysis

Statistical Package for Social Sciences (version 22) was used to perform the statistical tests (SPSS Inc. Chicago, IL, USA). Descriptive data were presented as mean±standard deviation (SD) for normally distributed data and as median (minimum-maximum) for non-normally distributed data. Categorical data were given as frequency. The comparison of genders was carried out using the Pearson's chi-square test. The fit of the data to the normal distribution was tested with the Kolmogorov-Smirnov test. The independent samples t-test was used to compare normally distributed data, and the Mann-Whitney U test was used to compare non-normally distributed data between independent groups. The Spearman correlation test was used to analyze the association between ODI and measured disease parameters. A correlation coefficient (r) of more than 0.30 and a value of $p<0.05$ were considered statistically significant.

RESULTS

Demographic characteristics and clinical parameters of the patient and the control groups are presented in Table 1. No statistically significant differences were found between groups in terms of gender, age, body mass index (BMI), or ODI scores. BASDAI, ESR, and CRP were statistically significantly higher in the study group ($p<0.05$). The disease duration was 7.5 (1.0–33.0) years in the study group. HLA-B27 was positive in 69% of our study. The disease characteristics of patients are given in Table 2.

Table 1. Demographic, anthropometric, and clinical characteristics of both groups.

	Patients (n=100)	Control (n=50)	p
Gender(female/male) (n)	28/72	17/33	0.45 (χ^2 test)
Age (years), median (min-max)	45.0 (27–64)	43.0 (25–63)	0.527
BMI (kg/m^2), median (min-max)	27.1 (18.1–47.3)	25.6 (21.1–40.2)	0.769·
ODI,median (min-max)	10.0 (0.0–48.0)	6.0 (0.0–30.0)	0.236·
ESR (mm/h), median (min-max)	17.5 (2–107)	8.0 (1–27)	0.0001·
CRP (mg/L), median (min-max)	3.5 (2.0–33.15)	3.0 (0.5–7.0)	0.001·
BASDAI, (mean±SD)	4.1±0.2	1.9±1.9	0.00··

Data were given as median (min-max) or mean±standard deviation (SD). n: number of patients; BMI: body mass index; BASDAI: Bath AS Disease Activity Index; ODI: Oswestry Disability Index; ESR: the Erythrocyte Sedimentation Rate; CRP: C-Reactive Protein. ·Mann-Whitney U test. ··Student's t-test.

Table 2. Disease characteristics of patients.

	Patients (n=100)
BASFI	2.8 (0.0–9.3)
BASMI	2.0 (0.0–9.0)
ASQoL	6.5 (0.0–18)
ASDAS-ESR	2.6 (1.0–5.8)
ASDAS-CRP	2.5 (1.0–4.9)
VAS-R	60.0 (0.0–100.0)
VAS-A	40.0 (0.0–80.0)
Disease duration (years)	7.5 (1.0–33.0)

Data were given as median (min-max). BASFI: the Bath Ankylosing Spondylitis Functional Index; BASMI: Bath Ankylosing Spondylitis Metrology Index; ASQoL: the Ankylosing Spondylitis Quality of Life; ASDAS-ESR: the Ankylosing Spondylitis Disease Activity Score-the Erythrocyte Sedimentation Rate; ASDAS-CRP: the Ankylosing Spondylitis Disease Activity Score-C-Reactive Protein; VAS-R: Visual Analog Scale-Rest; VAS-A: Visual Analog Scale-Activity.

Table 3. The correlation between Oswestry Disability Index score and Bath Ankylosing Spondylitis Disease Activity Index, Bath Ankylosing Spondylitis Functional Index, Bath Ankylosing Spondylitis Metrology Index, the Ankylosing Spondylitis Quality of Life, the Ankylosing Spondylitis Disease Activity Score-the Erythrocyte Sedimentation Rate, the Ankylosing Spondylitis Disease Activity Score-C Reactive Protein, Visual Analog Scale-Rest, Visual Analog Scale-Activity, and duration of disease.

	Patients (correlation coefficient/p-value)	Controls (correlation coefficient/p-value)
BASDAI	0.543/0.0001	0.401/0.004
BASFI	0.554/0.0001	
BASMI	0.317/0.01	
ASQoL	0.723/0.0001	
ASDAS-ESR	0.501/0.000	
ASDAS-CRP	0.530/0.000	
VAS-R	0.476/0.000	
VAS-A	0.441/0.000	
Disease duration (years)	0.085/0.401	

BASDAI: Bath Ankylosing Spondylitis Disease Activity Index; BASFI: Bath Ankylosing Spondylitis Functional Index; BASMI: Bath Ankylosing Spondylitis Metrology Index; ASQoL: the Ankylosing Spondylitis Quality of Life; ASDAS-ESR: the Ankylosing Spondylitis Disease Activity Score-the Erythrocyte Sedimentation Rate; ASDAS-CRP: the Ankylosing Spondylitis Disease Activity Score-C Reactive Protein; VAS-R: Visual Analog Scale-Rest; VAS-A: Visual Analog Scale-Activity.

The correlations between the ODI scores and BASDAI were moderate, with a correlation coefficient of r=0.543 in patients with AS and were weak, with a correlation coefficient of r=0.401 in the control group. Also, there was a significant correlation between ODI scores and BASFI, BASMI, ASQoL, ASDAS-ESR, ASDAS-CRP, and VAS values in patients with AS. There was no correlation found between the duration of the disease and BASDAI and ODI scores in patients with AS (Table 3).

DISCUSSION

Our study has shown that the ODI, a tool frequently used to quantify back pain, correlates quite well with the typical self-reported measures used to evaluate individuals with AS. This score's use in axial SpA was confirmed, and it had a significant correlation with the BASFI and BASDAI scores. The significant correlation of the ODI with the BASDAI and BASFI, when used to measure IBP, shows that it accurately reflects both activity and function domains[2]. We did not come across a study investigating the correlation between ODI and ASDAS-ESR, ASDAS-CRP, ASQoL, and BASMI in the literature. From this perspective, this is the first demonstration.

O'Shea et al.[2] found a strong correlation between the ODI score and BASFI and BASDAI in their study in a group of 49 patients with AS published in 2010. In this study, the correlations between the ODI and the total back pain score, the nocturnal

back pain score, and the patient global assessment scores were considered good. Although our results were very similar, we had a control group differently in our study, and additionally, we used ASDAS-CRP and ASDAS-ESR for disease activity measurement, ASQoL for quality of life (QoL), and BASMI for axial mobility.

In their retrospective case series study, Huang et al.[19] evaluated QoL and its correlation with clinical and radiographic variables in AS patients. In their study, they used SF-36 for health-related QoL. They found that poor QoL was significantly correlated with high disease activity, poor functional status, and decreased mobility in AS. Major predictors for the SF-36 physical function subscale were found to be ODI, BASFI, and BASMI. In our study, we chose to use ASQoL for QoL, and similar to this study, we found a significant correlation between ODI scores and BASFI, BASMI, and ASQoL.

In our study, we found that there is a significant correlation between the scores of ODI and BASFI, BASMI, ASQoL, ASDAS-ESR, ASDAS-CRP, and VAS values in patients with AS. Other medical staff who do not usually follow up with rheumatology patients and who are not familiar with BASDAI and BASFI scores can use ODI to record both activity and function domains in assessing back pain in patients with AS. In the present study, significant correlations were observed between ODI and ASQoL scores. There is also a significant correlation between ODI and BASMI scores in our study. These findings suggest that LBP and spinal immobility affect QoL negatively in patients with AS. It may be practical for active clinics to use only one scale (ODI) to evaluate the physical function, quality of life, and effectiveness of management strategies.

Measurements of AS symptoms and disability are not unique to inflammatory conditions; they also capture mechanical signs and present restrictions[8]. According to recent research, people with mechanical LBP have BASDAI ratings that are comparable to those of patients with AS[6,7]. Even after 40 years of AS, when mechanical symptoms are supposed to become more prominent, BASDAI scores stay comparatively steady. When used alone, BASDAI scores can give patients with long-standing AS a false-positive evaluation of AS activity[8]. Patients may be prescribed biological agents due to false assessments. Acute phase reactants are known to be of limited utility since AS activity measurements and other substitute markers have not yet been identified. For this reason, the use of ODI, ASDAS-ESR, and ASDAS-CRP, based on both clinical and laboratory measurements, can slightly reduce these misconceptions. In our study, we used ASDAS-ESR and ASDAS-CRP in addition to the BASDAI score for measuring disease activity and found a significant correlation with ODI, but we did not find a relationship between the duration of the disease and BASDAI and ODI scores among individuals with AS.

Some limitations of the study were that the patients were not evaluated in terms of concomitant fibromyalgia and neuropathic pain, and we did not divide the patients with chronic LBPs, whom we took as the control group, into specific diagnostic subgroups.

CONCLUSION

Evaluation of ODI with BASDAI may warn the physician to interpret high BASDAI scores in the context of mechanical pain. Medical staff who are not rheumatologists can use ODI during their daily practice to evaluate the physical function, QoL, and effectiveness of management strategies in patients with AS.

ETHICAL APPROVAL

The local ethics committee approved the study protocol with the number 350/2022. The study was performed in accordance with the principles of the Declaration of Helsinki.

AUTHORS' CONTRIBUTIONS

EA: Conceptualization, Data curation, Methodology, Project administration, Validation, Visualization, Writing – review & editing. **LO:** Conceptualization, Data curation, Methodology, Project administration, Validation, Visualization, Writing – review & editing. **HC:** Conceptualization, Data curation, Methodology, Project administration, Validation, Visualization, Writing – review & editing. B**TD:** Conceptualization, Data curation, Methodology, Project administration, Validation, Visualization, Writing – review & editing. **SED:** Conceptualization, Data curation, Methodology, Project administration, Validation, Visualization, Writing – review & editing.

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