

SUBMITTED 5 SEP 23

REVISION REQ. 26 NOV 23; REVISION RECD. 7 JAN 24

ACCEPTED 23 JAN 24

ONLINE-FIRST: MARCH 2024

DOI: <https://doi.org/10.18295/squmj.3.2024.023>

Navigating the Factors Affecting Functional impairment in Spondyloarthritis

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Abstract

Objectives: To assess the predictive factors of functional impairment in SpA patients assessed with BASFI (Bath Ankylosing Spondylitis Functional Index) and LI (Lequesne Index).

Methods: We conducted a retrospective study that included SpA patients. Socio-demographics and disease-related data were reported (data collection spread over four months from August 2019 to November 2019). Disease activity was assessed using the Bath Ankylosing Spondylitis-Global score (BASG-s) and the Bath Ankylosing Spondylitis disease activity Index (BASDAI). The spinal mobility was evaluated by The Bath Ankylosing Spondylitis Metrology Index (BASMI). Structural progression was evaluated with The Bath Ankylosing Spondylitis Radiologic Index (BASRI) and modified Stoke ankylosing spondylitis spine score (mSASSS). We conducted a multivariate analysis to search for predictive factors associated with BASFI and LI. Significance was accepted for a $p < 0.05$ for all statistical tests. **Results:** Two hundred and sixty-three patients were included. Mean age of the patients was 38.9 ± 12.7 years, sex-ratio=2.7. Mean age of onset of SpA was 27.6 ± 10.8 . Disease duration was 11.3 ± 9.5 years. Occupation was significantly associated with BASFI score and LI. A significant functional impact was significantly correlated with a long duration of the disease. The two scores were correlated with a limitation of spinal mobility (BASMI), a greater disease activity (BASDAI and ESR) and a greater impact of the disease on health status (BASG-s). Significant functional impairment was also correlated with structural

impairment: mSASSS, BASRI and sacroiliitis grade. The variables independently related to BASFI were the mSASSS score and the BASDAI. The variables independently related to LI were the profession (unemployed subjects had higher scores), mSASSS score, and the BASMI. **Conclusion:** Occupation, disease activity, mobility and structural progression predicted functional impairment in Tunisian SpA patients.

Keywords: Spondyloarthritis; North Africa; Function; Impairment.

Advances in Knowledge:

- *Comprehensive Assessment:* This article provides a thorough evaluation of functional impairment in spondyloarthritis (SpA) patients, utilizing both the BASFI and Lequesne Index (LI), shedding light on the underexplored LI in the context of SpA.
- *Comprehensive Factors:* It identifies a wide range of factors influencing functional impairment, including disease duration, occupation, disease activity, spinal mobility, structural progression, and health status, providing a comprehensive view of the multifaceted nature of SpA.
- *Unique Population:* This research focuses on North-African SpA patients, contributing valuable insights into the specific factors affecting this population, which may have distinct characteristics compared to other populations.

Application to Patient Care:

- *Early Intervention:* The identification of disease duration as a significant factor highlights the importance of early diagnosis and intervention to minimize functional impairment and enhance patients' quality of life.
- *Holistic Approach:* Healthcare providers can use the insights from this study to adopt a holistic approach to SpA management, considering not only disease activity but also mobility, structural progression, and patient-reported outcomes.
- *Tailored Care for North-African Patients:* The study's focus on North-African SpA patients facilitates culturally sensitive and region-specific care, ensuring that interventions align with the unique needs of this population.

Introduction

Spondyloarthritis (SpA) is a chronic inflammatory rheumatic disease that occurs particularly in young adult males. The prevalence of this disease varies across regions and data regarding

the North Africa and Middle East region is limited.¹ North African patients with SpA exhibit distinct clinical and genetic features. For one thing, North African patients tend to have more severe forms of SpA, with a higher prevalence of the axial form and of coxitis.^{1,2} Another important feature is the genetic trait of north African SpA patient with very low prevalence of HLA-B27.³

Occurrence of SpA in a young and active subject is what makes this disease an extremely challenging one. Thankfully, the perception of spondyloarthritis has shifted from a debilitating and disabling disease to one that can be managed and controlled with appropriate advanced therapy. However, although fascinating progress has been made the past decades in the fields of pathophysiology -but still far to be understood- and treatment, patients are still plaintive and still report symptoms of pain fatigue and functional impairment which are key patient-related outcomes (PROs).⁴

Patient age, sex, ethnicity, education level, smoking status, disease duration, medication use, family history of arthritis and inflammation emerged as potential risk factors for functional limitation in the literature.⁵ Functional impairment was also associated with increased levels of work disability and a decrease in work productivity.⁶ This, in turn, results in considerable economic and societal costs.⁷ Understanding how important these effects are, it becomes crucial for us to investigate the factors contributing to functional impairment among SpA patients.

In light of this, our study aims to leverage these insights to develop targeted interventions that can improve the quality of life and function of SpA patients. By doing so, we hope to contribute not only to individual well-being but also to the overall economy and society. Through this work, we propose to evaluate the functional impact in Tunisian SpA patients and identify the factors that are most correlated with the alteration of their functional prognosis.

Methods

Study design and patient selection criteria

This is a retrospective study that included SpA patients, all fulfilling the assessment of Spondyloarthritis International Society (ASAS) criteria, who were followed at the rheumatology department of the Mohamed Kassab Institute of Orthopedics between 2008 and 2019 with data collection spread over four months (August 2019 to November 2019). A data

collection form was drawn up and we extracted the relevant information from medical records. Patients with an associated chronic inflammatory rheumatism and those with pre-existing disabling conditions (Pre-existing disability independent of the disease and its complications) were not included to limit confounding factors. A data collection sheet was prepared. Significance was accepted for a $p < 0.05$ for all statistical tests.

Data collection

We reported Socio-demographics. The reported clinical data included the age of onset of the disease, the duration of SpA, the presence of spinal pain and coxitis, the search for extra-articular manifestations were recorded.

Disease activity, functional impact and spinal mobility were assessed using specific tools. Disease activity was assessed by inflammatory biomarkers (Erythrocyte sedimentation rate (ESR) and C-reactive protein (CRP), the Bath Ankylosing Spondylitis-Global score (BASG-s) and the Bath Ankylosing Spondylitis disease activity Index (BASDAI). The assessment of functional discomfort in SpA patients was scored using the Bath Ankylosing Spondylitis Functional Index (BASFI) and the hip Lequesne Index (LI). The presence of pain at enthesitis sites was evaluated by Maastricht Ankylosing Spondylitis Enthesitis Score (MASES). The spinal mobility was (evaluated by The Bath Ankylosing Spondylitis Metrology Index (BASMI)).

Assessment of structural involvement was determined by: The Bath Ankylosing Spondylitis Radiologic Index (BASRI) and modified Stoke ankylosing spondylitis spine score (mSASSS). The grading of sacroiliitis was done using the modified NY criteria.^{8,9} The radiological form of coxitis was specified (early coxitis, enveloping coxitis, pseudoarthritic coxitis, destructive coxitis and synostotic coxitis). Therapeutic modalities were mentioned.

Statistical analysis

All calculations were made using the Statistical Package for Social Sciences (SPSS) version 25.0 for Windows.

For the analytical study, the comparison of the qualitative variables was carried out by the analysis of variance (ANOVA with 1 factor). The study of correlation was performed by Pearson's correlation coefficient (r). Significance was accepted for a $p < 0.05$ for all statistical

tests. In order to find the variables independently linked to the bath ankylosing spondylitis functional index (BASFI) and the Lequesne index (LI), we conducted a multivariate analysis in multiple linear regression, step-by-step descending method (in the first step, we introduce all the variables and from step to step we remove the variable with the least significant "p").

Ethics and conflict of interest

All patients gave consent to participate. The Ethics committee name and number are Kassab institute ethical Committee, number IMKO018. This study was carried out in accordance with the guidelines in the Declaration of Helsinki. Standards of reporting: STROBE guidelines were followed. We declare that we have no conflicts of interest in this work. All authors contributed to this work.

Results

Two hundred and sixty-three patients were included. The mean age of the patients was 38.9 ± 12.7 years [16-79], 192 men (73%) and 71 women (27%). The mean age of onset of SpA was 27.6 ± 10.8 years [5-61]. Disease duration was 11.3 ± 9.5 years, [1-62]. According to ASAS criteria: SpA was axial in 43.1% of cases, peripheral in 44% of cases with enthesitic involvement in 19.1% of cases. SpA was axial and peripheral in 44.7% of cases. Socio-demographic and disease-related baseline characteristics are summarized in table1. The main clinical and paraclinical data are reported in Table 2.

Association of BASFI and LI with patient characteristics, disease characteristics, paraclinical data, and therapeutic modalities

Occupation was significantly associated with BASFI score and LI. The post hoc test showed a higher BASFI score ($p=0.010$) and LI ($p<0.001$) in the unemployed subjects. Regarding baseline disease-related features, a significant functional impact was significantly correlated with a long duration of the disease with $p=0.007$ for BASFI and $p<0.001$ for LI.

Peripheral involvement was also significantly associated with BASFI score and LI with $p=0.006$ and 0.021 respectively. Extra articular involvement was not associated with higher functional impairment ($p=0.907$ for BASFI and $p=0.152$ for LI). Neck and back pain were significantly associated with BASFI and LI scores. The same was true for coxitis, its bilateral character and the limitation of the hip mobility (table 3).

The two scores were correlated with a limitation of spinal mobility (BASMI), a greater disease activity (BASDAI and ESR) and a greater impact of the disease on health status (BASG-s) (Table 4).

Regarding the radiological data, radiological forms of coxitis ($p=0.037$ for BASFI score and $p<0.001$ for LI) were significantly associated with functional discomfort. The post hoc test showed that a destructive form of coxitis was associated with a higher BASFI score and LI. Significant functional impairment was also correlated with structural impairment: mSASSS ($p=0.001$ for BASFI and $p=0.003$ for LI), BASRI ($p<0.001$ for both BASFI and LI) and sacroiliitis grade ($p<0.001$ for both BASFI and LI).

Table 3 and 4 show association of BASFI and LI with patient characteristics, disease characteristics, paraclinical data, and therapeutic modalities

Multiple linear regression

The variables independently related to BASFI were the mSASSS score and the BASDAI. The variables independently related to LI were the profession (unemployed subjects had higher scores), mSASSS score, and the BASMI.

Table 5 shows the results of the multiple linear regression of factors associated with the BASFI score and the LI.

Discussion

Our study aimed to determine the main factors associated with significant functional impact in north-african SpA patients. BASFI and LI were higher in patients who were unemployed. Moreover, greater functional impact was associated with peripheral involvement, neck pain, back pain and coxitis. The elevation of both scores was also significantly correlated with a longer duration of disease progression. The BASFI and LI were correlated with a limitation of spinal mobility, greater disease activity. BASFI correlated with a higher MASES score and the presence of low back pain.

Regarding the association between radiological data and scores assessing functional discomfort, a high BASFI and LI were significantly associated with the presence of a destructive form of coxitis. They were also correlated with structural damage (mSASSS, BASRI, sacroiliitis grade).

On multivariate linear regression, the variables independently related to BASFI were the mSASSS score ($p=0.016$) and the BASDAI score ($p<0.001$). Variables independently related to higher LI values were work occupation (unemployed subjects) ($p=0.004$), mSASSS score ($p=0.046$) and BASMI ($p<0.001$).

To our knowledge, there have been very few studies in the literature evaluating the factors associated with a high LI, which is a French score developed in the 80s,¹⁰ in SpA patients. We were able to identify two published articles which used the Lequesne index to assess functional impairment in SpA patients.^{11,12} Interestingly, both articles were from Tunisia, a francophone country. This highlights one particularity of our study: the search for all potential factors associated with the LI in a population where it has been little used. However, this index is frequently used in practice to assess the functional impact of hip and knee damage in osteoarthritis patients. The search for all potential demographical, clinical and para clinical factors associated with functional impairment in a population of SpA patients known to have a higher prevalence of coxitis represents the other highlight of our study. However, the retrospective nature may be a limitation. Furthermore, the disease was active (BASDAI was >40) in 65.6% of cases. This could be explained by a recruitment bias because our study was carried out in a university hospital that manages severe forms of SpA.

Regarding the socio-demographic features, profession was significantly associated with the LI as well as the BASFI score. It was, indeed, independently associated to LI, with higher values in the unemployed subjects. The absence of professional activity would be the consequence of an important functional impact of the disease and not its cause. In the study by Ward MM et al⁵, on the other hand, each increase in the occupational physical activity score (a score that calculates the average of the level of activity of each job the patient has held in his or her lifetime (1 mild, 2 moderate, 3 intense), adjusted by the number of years spent in each job (score between 1 and 3)), the BASFI increased by 8.9 points. "Occupation" has emerged as an important health-related outcome in SpA. In fact, bulk of studies showed that the prevalence of work disability is high in these patients and is associated with both clinical and psychosocial factors.^{13,14} Specifically, labor-intensive jobs and manual professions were associated with poorer work outcomes.^{13,15} Yasemin Ul et al compared AS patients with healthy controls and found that functional impairment assessed by BASFI was a significant predictor of work instability scores.¹⁶ In our study, we found that unemployed patients had

higher scores on the BASFI and LI measures. This observation may be attributed to their inability to maintain employment due to functional limitations.

Regarding clinical examination, peripheral involvement was also significantly associated with LI and BASFI score. Indeed, the more enthesitic involvement, painful and swollen joints, the higher the BASFI score.¹⁷ Coxitis was particularly associated with a higher LI and BASFI. This is in line with the literature.^{18,19} It was, in fact, increased by 1.6 compared to patients without coxitis and higher values were found not only for all BASFI questions that seemed to assess functional impact on the hips (e.g. difficulty in getting up from the floor or a chair, tying shoes, climbing stairs), but also for those that did not assess gestures involving the hips such as looking over the shoulder without turning around.¹⁸ According to a recent study of patients with axSpA, it has been suggested that hip involvement has a greater impact on functional disability than axial structural damage. In addition, coxitis may affect the ability to accommodate a rigid lumbar spine, which may exacerbate functional limitations.²⁰ Coxitis remains a major and dreaded prognostic location in SpA patients, especially in north African population where it exists in higher prevalence.² Indeed, in our series, more than half the patients had coxitis. Fortunately, the treatment response seems similar to that of Western countries.² These data underline the importance of early management of coxitis. As the hip is a weight-bearing joint, its damage affects not only the patients' daily movements but also walking and thus the entire spinal statics, and would, hence, contribute to the aggravation of the deformities already present.

In our study, disease activity, as assessed by the BAS-G and BASDAI and ESR, was significantly correlated with LI. The same was true for the BASFI score. The association with BASDAI was found after multivariate analysis by linear regression, which underlines the pivotal role of this factor in the functional impact of the disease. Studies have supported the results of this analysis stating that BASDAI was independently associated with BASFI.^{21,22} The observed increase in functional impairment among patients with higher disease activity may be in part explained by a concomitant decrease in spinal mobility. In fact, BASDAI was reported to be associated with BASMI.²³

In our study, the BASMI was significantly associated with LI and BASFI score which has also been reported by other studies in the literature.²⁴ These data show that axial mobility limitation is closely related to function in these patients. More importantly, The BASMI was

independently associated with the LI after multivariate linear regression in our study. Spine mobility is a key clinical feature that should be assessed at baseline. It is strongly dependent on both inflammatory activity and structural damage, and the BASMI was proved to be more contributory in assessing this parameter compared to other scores.²³ Moreover, results from the DESIR cohort show that spinal inflammation is independently and positively associated with BASMI.²⁵

Inflammation, assessed with ESR values, has a significant anabolic effect on bone in SpA and based on longitudinal data, it appears that effectively managing inflammation may decelerate the radiographic advancement of axial spondyloarthritis.²⁶

This appears to be even more relevant as the association of both BASFI and LI with mSASSS was found after multivariate analysis by linear regression in our study. In fact, structural damage leads to decreased spinal mobility and difficulty to carry out daily tasks. Studies have concurred with the results of this analysis stating that mSASSS was independently associated with BASFI.²¹ Ankylosis in spondyloarthritis is the latest stage of structural damage. Although the natural course of the disease has changed positively over the past years, joint ankylosis is not rare and affects 20 to 50% of patients.²⁶ In our study, radiographic structural damage was assessed using mSASSS. However, this score measures anterior damage of the vertebrae and underestimates postero-lateral vertebral rim ankylosis such as ankylosis of the facet joint. Interestingly, J-Y jung et al showed that facet joint ankylosis may be more associated with functional impairment than syndesmophytes.²⁶ Consequently, both anterior and posterior structural damage should be investigated to gain a better understanding of the patient's condition.²⁷

Grade of sacro-iliitis was positively correlated with both BASFI and LI in our study. The impact of sacro-iliitis on clinical outcomes and functional status has been supported in some studies.^{28,29} In the German spondyloarthritis inception cohort, structural damage of the sacro-iliac joints influenced functional status and spinal mobility. The results suggested that an increase of one grade of radiographic sacroiliitis in a single joint is associated with a deterioration of 0.10/0.12 points in BASFI/BASMI, respectively, regardless of disease activity and structural damage in the spine.²⁸ As for the therapeutic modalities, neither NSAIDS nor DMARDS appeared in the multiple regression analysis.

Several studies in the literature have shown the involvement of NSAIDs in functional impairment. This was found in the study by Kroon FP et al³⁰ where the mean BASFI in the NSAID group decreased by 9.1 points (5.1 to 13) compared with the no treatment group. However, few studies have evaluated the effect of cDMARDs on the functional impact of the disease. In a Turkish case control study which included 51 patients with Ankylosing spondylitis,³¹ no improvement in BASFI score was noted when comparing patients receiving NSAIDs alone to those receiving them in combination with methotrexate. Similarly, no improvement in BASFI score was found after 16 weeks of methotrexate.³² Whereas for Gonzalez-Lopez L et al³³ the group receiving methotrexate had a better BASFI than the group receiving the placebo.

TNF alpha inhibitors did not influence the functional outcome of SpA in our study, whereas several authors have reported the beneficial effect of anti-TNF alpha on function during SpA.³⁴ This could be explained by the fact that only 7.76% of the patients in our study received TNF alpha inhibitors.

Our study has some strengths including the sample size which provides a good basis for reliable statistical analysis and the use of functional indexes that have been infrequently utilized in similar studies. Furthermore, the disease duration of patients in our series ranged from 1 to 62 years, enabling a credible assessment of functional impact. However, it is important to state the weaknesses of our study: First, the retrospective nature of the study does not allow us to establish a causal link and draw solid conclusions. However, there was very little missing data in the files. Second, the disease was active (BASDAI >40) in 65.6% of cases. This could be explained by a recruitment bias, as our study was carried out in a university hospital treating severe forms of SpA.

Conclusion

Our findings are consistent with the existing epidemiological data, which report a high prevalence of coxitis in north-african patients with spondyloarthritis. Employment status, spinal mobility, disease activity and structural damage emerged as predictive factors independently associated with functional impairment. Functional impairment was assessed using two robust and valid scores: BASFI and LI. The latter, more frequently used in European and French-speaking countries, has been used in particular in osteoarthritis patients and has proven its relevance and usefulness in spondyloarthritis patients. Early and effective

treatment is crucial for achieving rapid and sustained remission in spondyloarthritis. This should be defined, ideally, as remission across all clinical, biological and radiological domains. Thankfully, emerging therapies are targeting all three domains and have, therefore, revolutionized management of spondyloarthritis, providing new opportunities to optimize patient outcomes. Prospective studies with a long-term follow-up of the patients are needed for a better evaluation of the effect of these new therapeutic modalities on the functional impact of the disease.

Author Contributions

KM contributed to the conceptualization and correcting the original draft, final approval and agrees to be accountable for all aspects of the work. IC was involved in writing the original paper and also agrees to be accountable for all aspects of the work. HF and DBN were responsible for the analysis. RB acquired the data. DK and WH were involved in supervision. All authors approved the final version of the manuscript.

Conflicts of Interest

The authors declare no conflict of interests.

Funding

No funding was received for this study.

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Table 1: Socio demographic and disease-related features

Socio-demographics and disease-related features		
Age (years) mean± SD [min-max]		38.9 ± 12.7 [16-76]
Sex ratio		2.7
Status n,(%)	Single	119,(45.2)
	Married	136,(51.7)
	Divorced	6,(2.3)
	Widow(er)	2,(0.8)

Level of education n,(%)	Illiterate	33,(12.6)
	Primary level	95,(36.1)
	Secondary level	95,(36.1)
	Higher level (university)	40,(15.2)
Professional occupation n,(%)	Salaried employment	116,(44.1)
	Self-employed	27,(10.3)
	Unemployed	92,(35)
	Student	18,(6.8)
	Retired	10,(3.8)
Social class, n,(%)	Disadvantaged	62, (23.6)
	Middle class	174, (66.1)
	Privileged	27, (10.3)
Age at onset (years) mean± SD [min-max]		27.6 ± 10.8 [5-61]
Disease duration (years) mean± SD [min-max]		11.3 ± 9.5 [1-62]
Classification of SpA n,(%)	axial	113,(43.1)
	peripheral	115,(44)
	Axial and peripheral	117,(44.7)
Extra-articular manifestation, n,(%)		62,(23.6)

SD:standard deviation, n=number

Table 2: Main Clinical and paraclinical data

Clinical and para-clinical data			
Number of tender joints, mean± SD [min-max]		1.3 ± 2.5 [0-16]	
Number of swollen joints, mean± SD [min-max]		0.2 ± 0.8 [0-7]	
Coxitis n,(%)		281,(53.5)	
BASMI mean± SD [min-max]		3.9 ± 2.3 [0-10]	
MASES mean± SD [min-max]		1.9 ± 2.8 [0-13]	
HLA B27 allele (%)		56.3	
Disease activity	BASG-s mean± SD [min-max]	38.1 ± 30.8 [0-100]	
	BASDAI, mean± SD [min-max]	49.4 ± 30 [0-100]	
	ESR mm/h mean± SD [min-max]	36.6 ± 26.3 [2-125]	
Imaging findings	mSASSS mean± SD [min-max]		15 ± 18.2 [0-72]
	Sacroiliitis (%)	Grade 1/grade 2	1.9/ 12.6
		Grade 3/ grade 4	38.8 / 46.7
	BASRI mean± SD [min-max]	Hips	3.3 ± 2.3 [0-4]
		Sacro-iliac	3.14 ± 0.9 [0-4]
		Spine	3.3 ± 2.3 [0-8]
		Total	8.2 ± 3.9 [0-16]

Functional impact	BASFI, mean± SD [min-max]	45.8 ± 25.7 [0-100]
	LI, mean± SD [min-max]	7.5 ± 6.4 [0-22]

BASFI: Bath Ankylosing Spondylitis functional index, LI: hip Lequesne Index, BASMI: Bath Ankylosing Spondylitis metrology Index, BASDAI: Bath Ankylosing Spondylitis disease activity Index, BASG-s: Bath Ankylosing Spondylitis global score, ESR: erythrocyte sedimentation rate, BASRI: Bath Ankylosing Spondylitis Radiologic Index, MASES: Maastrich Ankylosing Spondylitis Enthesitis Score, mSASSS: the Modified stoke ankylosing spondylitis spinal score.

Table 3: Association of BASFI score and LI with the qualitative parameters

		BASFI (p)	LI (p)
Gender		0.799	0.104
Level of education		0.076	0.003
Professional occupation		0.010	<0.001
Classification of SpA	Axial	0.157	0.485
	Peripheral	0.006	0.021
HLA B27 allele		0.153	0.651
Site of the spinal pain	Cervical spine	<0.001	<0.001
	Dorsal spine	0.003	0.011
	Lumbar spine	0.025	0.371
	Buttock pain	0.274	0.3
Coxo-femoral joint	coxitis	<0.001	<0.001
	bilateral	<0.001	<0.001
	Joint limitation	<0.001	<0.001
BASMI		<0.001	<0.001
MASES		<0.001	0.108
BASG-s		<0.001	0.025
BASDAI		<0.001	<0.001
CsDMARDS	Yes/no	0.587	0.051
	Type	0.280	0.541
bDMARDS	Yes/no	0.812	0.175
	Type	0.236	0.282
Surgical treatment (THR)		0.019	<0.001

BASFI: Bath Ankylosing Spondylitis functional index, LI: hip Lequesne Index, BASMI: Bath Ankylosing Spondylitis metrology Index, BASDAI: Bath Ankylosing Spondylitis disease activity Index, BASG-s: Bath Ankylosing Spondylitis global score, BASRI: Bath Ankylosing Spondylitis Radiologic Index, MASES: Maastrich Ankylosing Spondylitis Enthesitis Score, CsDMARDS: Conventional synthetic disease-modifying antirheumatic drugs, bDMARDS: biologic disease-modifying antirheumatic drug, THR: total hip replacement, p: Significance one-factor ANOVA test

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517 **Table 4:** Correlation of BASFI score and LI with the quantitative parameters

		BASFI		LI	
		r	P	r	P
Disease duration		0.175	0.007	0.248	<0.001
BASMI		0.501	<0.001	0.573	<0.001
BASG-s		0.299	<0.001	0.141	0.025
BASDAI		0.46	<0.001	0.278	<0.001
ESR		0.253	0.001	0.215	0.003
mSASSS		0.238	0.001	0.212	0.003
BASRI	hips	0.322	<0.001	0.610	<0.001
	Sacro-iliac	0.277	<0.001	0.307	<0.001
	spine	0.286	<0.001	0.209	0.001
	total	0.385	<0.001	0.468	<0.001
Grade of Sacroiliitis		0.254	<0.001	0.353	<0.001

518 *BASFI: Bath Ankylosing Spondylitis functional index, LI: hip Lequesne Index, BASMI: Bath*
519 *Ankylosing Spondylitis metrology Index, mSASSS: the Modified stoke ankylosing spondylitis*
520 *spinal score, BASDAI: Bath Ankylosing Spondylitis disease activity Index, BASG-s: Bath*
521 *Ankylosing Spondylitis global score, BASRI: Bath Ankylosing Spondylitis Radiologic Index,*
522 *ESR: Erythrocyte sedimentation rate, r: Pearson correlation coefficient, p: Significance one-*
523 *factor ANOVA test*

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525 **Table 5:** Multiple linear regression of factors associated with BASFI score and LI

	BASFI			LI		
	β	95% confidence interval of β []	p	β	95% confidence interval of β []	p
Profession	4.20	[-5.66 ,14.08]	0.396	2.72	[0.880 , 4.564]	0.004
BASMI	0.70	[-2.60, 4.01]	0.669	1.15	[0.626 , 1.679]	<0.001
mSASSS	0.29	[0.05 , 0.53]	0.016	-0.06	[-0.118 , -0.001]	0.046
BASDAI	0.62	[0.42 , 0.83]	<0.001	0.01	[-0.031, 0.061]	0.524

526 *BASFI: Bath Ankylosing Spondylitis functional index, LI: hip Lequesne Index, BASMI: Bath*
527 *Ankylosing Spondylitis metrology Index, mSASSS: the Modified stoke ankylosing spondylitis*
528 *spinal score, BASDAI: Bath Ankylosing Spondylitis disease activity Index.*