ORIGINAL PAPER

# Assessment of factors affecting quality of life in patients with chronic pain due to knee osteoarthritis and spondylosis: spine *versus* knee?

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**SUMMARY**

*Objective.* There is no study comparing knee and spine osteoarthritis. The purpose of the study is to examine the effects of pain and disability on quality of life (QoL) and the factors affecting QoL in patients with knee osteoarthritis and spondylosis.

*Methods.* This cross-sectional study included 114 patients with spondylosis and 126 patients with knee osteoarthritis. Demographic data were recorded. The visual analog scale (VAS), Western Ontario and McMaster Universities Osteoarthritis Index (WOMAC), Roland Morris Questionnaire (RMQ), and the Short Form Health Questionnaire (SF-36) were filled out.

*Results.* Statistically, patients with spondylosis and knee osteoarthritis did not differ significantly in terms of gender, age, body mass index, number of concomitant conditions, marital status, years of schooling, pain scores, or SF-36 characteristics. SF-36 physical function, vitality, and mental health assessments were lower in women than men, while VAS scores were higher. There was no correlation between marital status, educational level, and QoL subscales. WOMAC and RMQ scores were negatively correlated with the SF-36 subscales. RMS scores were not related to mental health.

*Conclusions*. Spondylosis and knee osteoarthritis affect all subscales of QoL in the same way. The management of patients with spondylosis and knee osteoarthritis should focus on pain and functionality to improve QoL.

***Key words**: Quality of life, osteoarthritis, spondylosis, chronic pain.*

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## INTRODUCTION

With the increase in the elderly population, the incidence of musculoskeletal diseases is also rising. Often, the spine and knee are affected, causing chronic musculoskeletal pain (1), which leads to disability and affects quality of life (QoL) (2). Osteoarthritis is one of the most common causes of chronic musculoskeletal pain and remains a significant problem for individuals and societies worldwide due to its increasing prevalence (3). In the EPISER 2016 study, the prevalence of symptomatic osteoarthritis in Spain was investigated, and the highest prevalence was found in the lumbar spine with a rate of 15.52%. Also, knee osteoarthritis was the second most common, with a rate of 13.83% (4). It has been reported that disability caused by osteoarthritis impairs QoL by affecting social life, relationships, and mood (1, 5).

The World Health Organization defines QoL as "an individual's perception of their position in life in the context of the culture and value systems in which they live and in relation to their goals, expectations, standards and concerns" (6). Health-related QoL (HRQoL) is recognized as part of overall QoL (7).

Traditionally, clinicians' goals when treating diseases, including chronic pain associated with osteoarthritis, have been to reduce pain and improve functionality. With a greater emphasis on overall health perception, it is essential to evaluate the patient's

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complete health and QoL during clinical practice, including a comprehensive biopsychosocial assessment (5, 8, 9). To aid patients in their recovery and treatment regimes, identification of the factors influencing the QoL of individuals affected by osteoarthritis is imperative (7). Therefore, current studies have focused on examining the factors affecting QoL in patients with chronic pain due to osteoarthritis (10). Recently, the effect of osteoarthritis-related ankle (11), knee (12), and spine involvement on QoL has been studied (13). Bindawas *et al*. examined the effect on QoL according to the severity of knee osteoarthritis (14). Another recent study examined hip and knee osteoarthritis. The effects of hip and knee osteoarthritis on QoL have been compared to evaluate the peripheral joint effects of osteoarthritis (15). However, the lumbar spine and the knee are the most common areas of symptomatic osteoarthritis (4). We are not aware of any studies comparing spine and knee osteoarthritis in the literature. Therefore, it is hypothesized that pain and stiffness associated with activity in the affected area may impact patients' life, affecting their functionality, daily activities, and social interactions. Ultimately, this may also differ in terms of the disease's impact on their QoL. Spine and knee involvement due to osteoarthritis induces different functional limitations, and its effect on QoL may be different. Determining and comparing the factors affecting QoL is also important in terms of the biopsychosocial management of these patients.

This study compared the effects of pain and disability on QoL in people with chronic pain from spondylosis and knee osteoarthritis. The second aim of the study was to examine the factors affecting QoL in patients with chronic pain due to knee osteoarthritis and spondylosis.

## MATERIALS AND METHODS

### *Study population*

This cross-sectional study was conducted in 240 patients between March 27, 2022, and March 31, 2023, in the Physical Medicine and Rehabilitation outpatient clinic of a research hospital. 586 patients who applied to the outpatient clinic with chronic (>3 months) non-radicular low back pain (LBP) or knee pain were evaluated by the same physiatrist doctor with a physical examination and X-ray imaging. Knee osteoarthritis and spondylosis often coexist. For the design of this study, it was important to exclude the coexistence of these two diseases. For this reason, both knee and lumbar radiographs were examined in patients presenting simultaneously knee and LBP symptoms. 77 patients with concomitant knee osteoarthritis and spondylosis were excluded from the study (Figure 1).

Knee X-rays were taken in standing anteroposterior and lateral positions and joint space narrowing, osteophyte, and sclerosis were investigated. The Kellgren-Lawrence (KL) staging system was used (16), and patients with stage 2-3 knee osteoarthritis and knee pain complaints lasting longer than 3 months were included.

Lateral lumbar X-rays in the standing position with focal point at the second vertebra were taken for the diagnosis of spondylosis. Space narrowing, osteophytes, and endplate sclerosis were evaluated on the radiographs, and the KL staging system was used for the staging of spondylosis (17). Accordingly, patients who presented with the complaint of non-radicular LBP for more than 3 months and were diagnosed with KL stage 2-3 spondylosis were included. Patients who described radicular pain and neuropathic pain in order to exclude knee pain referred from L2-L3 vertebrae were excluded from the study. The Douleur Neuropathic 4 Questions (DN-4) questionnaire was utilized to assess the presence of neuropathic pain due to its simplicity and efficiency (18, 19). Patients whose DN-4 score exceeded 4 were excluded from this study on the basis of suspected neuropathic pain. At physical examination, the straight leg raising test, Lasegue's test, and femoral nerve tension test were applied to all patients with LBP. Additionally, during the physical examination, McMurray's test, Lachman's test, Anterior and Posterior Drawer tests, Lateral Pivot Shift, Apley Compression, Varus and Valgus Stress tests were applied

to all patients who presented with knee pain. Patients with positivity in any of these special tests were excluded from the study (Figure 1).

Patients with chronic widespread pain and those with unclear diagnoses and indications for further examination were excluded from the study. Patients diagnosed with fibromyalgia syndrome following the American College of Rheumatology 2010 diagnostic criteria were excluded, as fibromyalgia syndrome may considerably impact pain and QoL. Abnormal sensation or reflex findings in the lower extremities, indication for surgery, previous knee or lumbar surgery history, motor weakness, presence of additional neurological disease that could affect the patient's cognitive level and mobilization, cognitive impairment (mini-mental scale<23) (20), non-musculoskeletal (gynecological, retroperitoneal, abdominal) chronic pain and ongoing psychiatric treatment were considered exclusion criteria (Figure 1).

### *Measurements*

*Demographic data and pain*

Gender, body mass index (BMI), comorbid diseases, education level, and marital status were evaluated. The visual analog scale (VAS), a numeric rating scale, was used to indicate the severity of pain. Accordingly, the highest severity of pain was scored as 10 points, no pain was scored as 0 points. The patients were asked to score the severity of the pain they experienced in the last week between 0 and 10 (21).

*Functional limitations*

The Roland Morris Questionnaire (RMQ) was used to evaluate patients with chronic LBP for their level of disability. The RMQ, a simple, sensitive, and interculturally adapted scale, assesses functional limita-

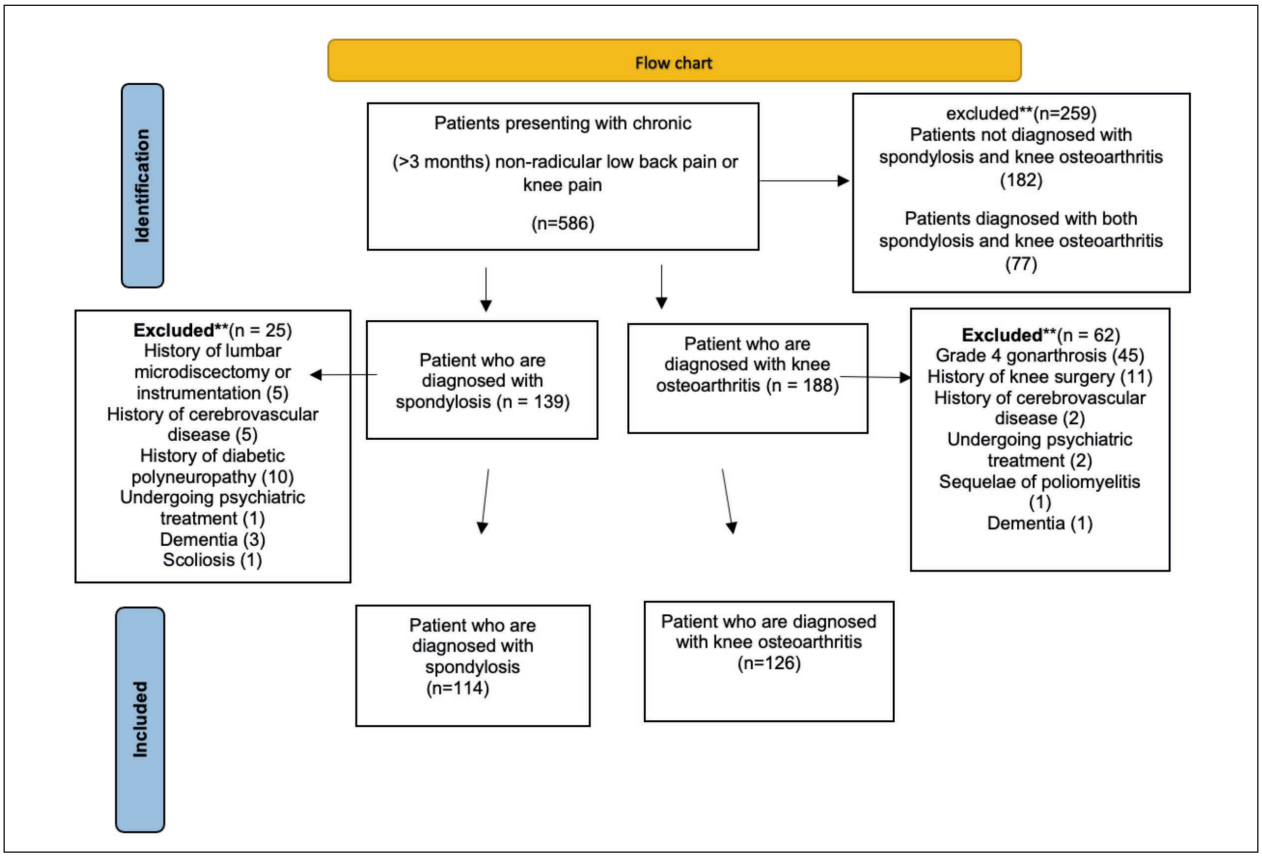


**Figure 1** - Flow chart.

tions due to LBP (22, 23). It investigates patients' mobility, self-care, and sleep status and includes a total of 24 items. The maximum total score on the scale is 24 with high scores indicating impaired functionality. It is recommended to use the RMQ as a unidimensional scale to evaluate the disability caused by LBP (24).

The Western Ontario and McMaster Universities Osteoarthritis Index (WOMAC) was used to assess disability in patients with knee osteoarthritis. The WOMAC assesses pain, stiffness, and physical function and consists of 24 items. Each question is scored between 1 and 5 points. Section A total score is between 5 and 25 points; section B total score is between 2 and 10 points; and section C total score is between 17 and 85 points. The total score is between 24 and 120 points. A low score indicates mild illness and a high score indicates severe illness (25). A cultural adaptation of the scale was made (26).

*Quality of life*

The Short Form Health Questionnaire (SF-36), which evaluates HRQoL in 8 subgroups, includes 36 items. Physical functionality, bodily pain, physical role limitation, vitality, social function, emotional role limitation, mental health, and general health are some of these subcategories (27).

***Ethical approval***

Ethics committee approval was obtained for the study from the local ethics committee with the number KAEK/2021.11.306. Before study enrollment, the study was registered on Clinicaltrials.gov (Clinical Trials ID: NCT05298566). The study was conducted following the 1964 Declaration of Helsinki. A written informed consent form was obtained from all patients.

***Sample size calculation***

Using G*Power 3.1.9.6 and the primary hypothesis that the chronic LBP group's QoL values are lower than those of the chronic knee pain group, the sample size for the t-test difference between the two groups was computed. The sample size was determined to be at least 240 people in total for two groups, with an effect size of d=0.32, 80% power, and a 5% margin of error (15).

***Statistical analysis***

The data from our study were examined using the SPSS Statistics 25.0 application (IBM, Armonk, NY, USA). The Shapiro-Wilk test was used to assess the normality of the data. In comparisons between the two groups, gender and marriage status, which are categorical data, were compared with the Chi-square test, and BMI, which is parametric data with a homogeneous distribution, was compared with the independent t-test. Since other parametric data in the study did not comply with normal distribution, comparisons between the two groups were made with the Mann-Whitney U test. Correlations were assessed using the Spearman tests. At $p<0.05$, differences were deemed significant.

## RESULTS

In this study, 114 patients with spondylosis and 126 patients with knee osteoarthritis were included. 185 (77.1%) of the patients were female and 55 (22.9%) were male, with a mean age of 61.63±7.50 years and a mean BMI of 31.35±4.23. The mean VAS activity pain score was 7.10±1.45. The number of chronic comorbid diseases was 1.39±0.74. The mean WOMAC total scores of patients with knee osteoarthritis were 62.57±16.44, while the mean RMS of patients with spondylosis was 16.77±3.55. There was no significant difference between spondylosis and knee pain patients' gender, age, BMI, number of chronic comorbidities, marital status, years of education, pain scores, and SF-36 evaluations (Table I).

Of the patients, 73 were in KL stage 2 (30.4%) and 167 (69.6%) were in KL stage 3. When the SF-36 evaluations of the patients were compared according to the KL classification, the physical function, body pain, and general health subgroups were statistically lower in the KL stage 3 group in both the knee and LBP groups. In addition, role limitation was lower in the knee group (0.045), and vitality was lower in the

**Table I** - Comparison of assessment results between osteoarthritis groups.

| | Lumbar (n=114) | Knee (n=126) | p value | Total (n=240) |
|---|---|---|---|---|
| Sex (%) | | | 0.729 | |
| Female | 89 (78.1) | 96 (76.2) | | 185 (77.1) |
| Male | 25 (21.9) | 30 (23.8) | | 55 (22.9) |
| Age (yr) | 62.00±5.61 | 61.23±8.80 | 0.452 | 61.63±7.50 |
| BMI | 31.72±4.42 | 31.01±4.04 | 0.197 | 31.35±4.23 |
| Marital status (%) | | | 0.260 | |
| Single/divorced/widow | 27(23.7) | 38 (30.2) | | 65 (27.1) |
| Married | 87 (76.3) | 88 (69.8) | | 175 (72.9) |
| Education (yr) | 7.89±3.36 | 8.24±3.79 | 0.461 | 8.08±3.59 |
| Comorbid disease | 1.49±0.65 | 1.30±0.81 | 0.069 | 1.39±0.74 |
| VAS score | 6.95±1.35 | 7.24±1.53 | 0.123 | 7.10±1.45 |
| SF-36 physical function | 40.70±15.40 | 43.36±18.60 | 0.227 | 42.10±17.17 |
| SF-36 role limitation-physical | 34.76±16.69 | 36.11±32.95 | 0.685 | 35.47±26.46 |
| SF-36 role limitation-emotional | 54.09±21.36 | 57.27±37.39 | 0.414 | 55.76±30.82 |
| SF-36 vitality | 49.21±14.48 | 48.94±19.29 | 0.904 | 49.07±17.14 |
| SF-36 mental health | 61.33±13.33 | 64.60±20.02 | 0.136 | 63.05±17.22 |
| SF-36 social function | 59.58±17.31 | 61.59±23.17 | 0.443 | 60.63±20.58 |
| SF-36 bodily pain | 42.80±12.09 | 45.69±17.41 | 0.133 | 44.32±15.15 |
| SF-36 general health | 44.82±13.71 | 47.51±17.53 | 0.185 | 46.24±15.85 |

yr, years; BMI, body mass index; VAS, visual analog scale; SF-36, Short Form Health Questionnaire.

lumbar group (p=0.012). When all patients included in the study were compared according to KL classification, physical function (KL-2: 46.58±17.58, KL-3: 40.14±16.67; p=0.007), bodily pain (KL-2: 47.49±15.23, KL-3: 42.94±14.96, p=0.037) and general health (KL-2: 44.00±14.52, KL-3: 51.36±17.59, p<0.001) subgroups were lower in the KL stage 3 group. When SF-36 scores of all patients included in the study were compared according to gender, SF-36 physical function (p=0.022), vitality (p=0.017) and mental health (p=0.005) assessments were statistically significantly lower in women than in men, while VAS activity scores (p=0.015) were higher. There was no correlation between marital status and QoL subscales (p>0.05).

The association between age and SF-36 scores showed a negative correlation in all subgroups except vitality, and the association between BMI and SF-36 scores showed a negative correlation in all subgroups except vitality and mental health subgroups. The WOMAC total scores of patients with knee osteoarthritis were negatively correlated with the whole SF-36 subgroups, and the RMS scores of patients with spondylosis were negatively correlated with all SF-36 subgroups except mental health. When the relationship between VAS scores and SF-36 scores was analyzed, a negative correlation was found in all SF-36 sub-scores. The correlation between the number of comorbid diseases and SF-36 scores was found to be negative in all subgroups except role limitation-emotional. There was no correlation between patients' education level and SF-36 scores (Table II).

## DISCUSSION

Female patients with spondylosis and knee osteoarthritis reported more pain and were more affected than men in the physical function, mental health, and vitality subscales of QoL. Marital status and education level did not affect QoL in this patient population.

When the factors affecting QoL in patients with spondylosis and knee osteoarthritis were analyzed, we found that pain and functionality affected all subscales of QoL.

In spondylosis patients, no relationship was found with functionality only in the mental health subscale. Age affects physical function, mental health, social functions, pain, and general health perception. BMI affects all parameters except vitality and the mental health subscales of QoL in patients with spondylosis and knee osteoarthritis. The presence of comorbid disease affects physical function, pain, general health perception, mental health, physical role limitation, and social function.

In the literature, it has been reported that patients with osteoarthritis with lower extremity involvement have more depressive symptoms compared to healthy subjects (28). The results of this study, however, showed that there was no distinction between spondylosis and knee osteoarthritis in terms of QoL, including mental health. Studies examining the impact of age on QoL have reported that increasing age is associated with worse QoL and that older patients report more pain and disability (5, 8). The results of this study also support this knowledge.

A review of studies examining patients diagnosed with osteoarthrosis concluded that women reported worse QoL than men (5). In a meta-analysis, women with chronic LBP reported more pain and disability and lower QoL compared to men (8). The results of this study also support this information. The female gender reported more pain intensity, a fact that may be related to the lower pain threshold of women. The impact on the physical function of QoL in female patients with spondylosis and knee osteoarthritis may be explained by the higher pain intensity. Additionally, according to the results of this study, mental health and vitality are more affected in women. Therefore, clinicians should be aware that pain intensity, functionality, and mental health will be more affected in female patients with spondylosis and knee osteoarthritis. Female patients should also be evaluated for pain management and psychological support from a biopsychosocial perspective. Moreover, Jeong *et al*. found that functional limitations directly affect QoL more in men compared to women. They attributed this to the fact that men have more social roles than women, especially in Korea (1). Their results are different from those of the present study. This suggests that QoL should be evaluated in light of the pertinent cultural values.

In a recent study evaluating patients with chronic nonspecific LBP, Jaromi *et al*. found that higher education levels had better results in QoL, especially in general

**Table II** - Analysis of factors affecting the Short Form Health Questionnaire subgroups.

| SF-36 | | Physical function | Role limitation - physical | Role limitation - emotional | Vitality | Mental health | Social function | Bodily pain | General health |
|---|---|---|---|---|---|---|---|---|---|
| VAS score | r | -0.506 | -0.280 | -0.285 | -0.285 | -0.243 | -0.333 | -0.450 | -0.423 |
| | p | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| WOMAC score total | r | -0.650 | -0.339 | -0.270 | -0.404 | -0.206 | -0.257 | -0.348 | -0.398 |
| | p | <0.001 | <0.001 | 0.002 | <0.001 | 0.021 | 0.004 | <0.001 | <0.001 |
| Rolland Morris | r | -0.761 | -0.368 | -0.337 | -0.237 | -0.020 | -0.259 | -0.357 | -0.431 |
| | p | <0.001 | <0.001 | <0.001 | 0.011 | 0.829 | 0.005 | <0.001 | <0.001 |
| Age (yr) | r | -0.129 | -0.093 | -0.102 | -0.101 | -0.260 | -0.318 | -0.387 | -0.235 |
| | p | 0.046 | 0.149 | 0.115 | 0.119 | <0.001 | <0.001 | <0.001 | <0.001 |
| BMI | r | -0.223 | -0.134 | -0.249 | -0.126 | -0.052 | -0.141 | -0.344 | -0.359 |
| | p | <0.001 | 0.037 | <0.001 | 0.052 | 0.418 | 0.029 | <0.001 | <0.001 |
| Comorbid diseases | r | -0.177 | -0.129 | -0.094 | -0.166 | -0.265 | -0.182 | -0.312 | -0.172 |
| | p | 0.006 | 0.046 | 0.147 | 0.041 | <0.001 | 0.005 | <0.001 | 0.008 |
| Education (yr) | r | 0.034 | 0.014 | 0.015 | -0.067 | -0.016 | 0.111 | 0.099 | 0.061 |
| | p | 0.603 | 0.826 | 0.813 | 0.298 | 0.805 | 0.086 | 0.127 | 0.345 |

yr, year; SF-36, Short Form Health Questionnaire; VAS, visual analog scale; WOMAC, Western Ontario and McMaster Universities Osteoarthritis Index; BMI, body mass index.

health and physical functioning subscales, compared to lower education levels. The researchers explained this as a result of higher educational levels showing more interest in the disease and having a wider range of treatment options, which in turn improves QoL (29). A recent review of QoL in patients with osteoarthritis examined the social determinants of health and found that a low educational level was associated with poor QoL in patients with osteoarthritis (5). However, according to the findings of our study, educational status had no effect on any subscale of QoL.

Divorced or single participants with chronic LBP gave less positive responses in the mental health subscales. In the literature, it has been reported that cohabitation and marital status support the protective and improving effects of health on chronic diseases (29). The study's findings show no connection between married status and QoL. In this study, there were more married patients than single patients in both groups. This may have caused the difference between Jaromi et al.'s study and ours.

It has been reported that chronic musculoskeletal pain affects QoL, especially physical health and mental health subscales (30). Chronic pain increases distress levels, impairs well-being, decreases functionality, and affects family and social roles, thus decreasing QoL (31). Pain intensity and disability were found to have an impact on QoL in a review of patients with chronic LBP (7). Jaromi et al. reported a strong and significant relationship between functionality and all subscales of QoL in patients with chronic LBP. Also, functional limitations affected QoL as a whole (29). In another study, it was reported that knee osteoarthritis was associated with poor QoL, especially in the pain subscale (32). The results of this study also support this knowledge. Pain and functionality have an impact on all QoL subscales.

On the other hand, a longitudinally designed study reported that the effect of disability on QoL was greater than that of pain severity. This was associated with the patient's perception of pain and its effect on daily activities, rather than the level of pain. They reported that, when evaluating patients, it was necessary to focus on disability rather than pain intensity (33). However, according to the results of this study, pain and functionality follow a parallel trend. The increase in pain intensity brings along functional limitations.

***Limitations***

Although we excluded patients receiving psychiatric treatment while establishing the inclusion criteria, the psychological status and kinesiophobia levels of the participants, sleep quality, and social support were not asked in this study. These conditions also affect QoL. Additionally, posture and muscle stiffness were not investigated.

When analyzing the study's data, it is critical to remember that symptomatic participants were used in the research. Asymptomatic osteoarthritis cases do not constitute the sample of this study. Additionally, through questioning of the symptoms spanning the past 3 months, systematic osteoarthritis coexistence has been excluded. Despite all these limitations, the fact that the diagnosis was made through detailed physical examination and imaging methods increases the methodological quality of the study. Additionally, when evaluating the data from this study, it is important to consider that patients with osteoarthritis included in the study may have other joints affected besides the knee and spine.

Given the inclusion criteria of our study, which was limited to patients at KL stages 2 and 3, comparative analyses were confined exclusively to these two groups. Consequently, data about individuals at KL stages 1 and 4 were outside the scope of our evaluation, preventing any stage-related assessments or inter-stage comparisons. To facilitate a more comprehensive understanding of KL staging impacts, further studies encompassing a broader range of KL stages are warranted.

## CONCLUSIONS

The study's findings suggest that spondylosis and knee osteoarthritis have a similar impact on all QoL subcategories. Pain in-

tensity is higher in the female gender, and this affects functional limitation, vitality, and mental health. Pain intensity and functionality have an impact on all QoL subcategories. There is no relationship between marital status, education level, and QoL.
The findings of this study suggest that, to improve QoL, the treatment of individuals with spondylosis and knee osteoarthritis should concentrate on pain intensity and functionality. We recommend that clinicians keep in mind that pain intensity, functioning, and mental health will be more affected in female patients presenting with spondylosis and knee osteoarthritis. Female patients should also be evaluated from a biopsychosocial perspective in terms of pain management and psychological support.

**Contributions**
Both authors made a substantial intellectual contribution, read and approved the final version of the manuscript and agreed to be accountable for all aspects of the work.

**Conflict of interest**
The authors declare that they have no competing interests, and all authors confirm accuracy.

**Ethics approval and consent to participate**
Approval was obtained for the study from the local ethics committee with the number KAEK/2021.11.306. Prior to study enrollment, the study was registered on Clinicaltrials.gov (Clinical Trials ID: NCT05298566). The study was conducted in accordance with the 1964 Declaration of Helsinki.

**Informed consent**
A written informed consent form was obtained from all patients.

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None.

**Availability of data and materials**
Data and materials are available from the corresponding author upon request.

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