

## **Introduction**

The sacroiliac joint (SIJ) is a frequently neglected cause of low back and hip pain. SIJ pain is determined by clinical evaluation in patients with pregnancy-related low back pain and its prevalence ranges from 24% to 90%<sup>1</sup>. The SIJ is an auricle-shaped, diarthrodial synovial joint between the sacrum and ilium<sup>2</sup>. Although the exact cause is unknown, risk factors for SIJ pain include abnormal gait pattern, leg length discrepancy, scoliosis, prolonged heavy physical exercise, trauma, and pregnancy<sup>3</sup>. Dysfunction of the SIJ is an especially common cause of pain during pregnancy<sup>4</sup>. Hyperlordosis of pregnancy, increased ligamentous laxity due to weight gain, and increased hormone production create significant mechanical tension in the pelvis and low back. These factors particularly put stress on the SIJ, thereby contributing to SIJ pain<sup>4</sup>. Anti-inflammatory drugs and physical therapy are commonly used for treatment of SIJ pain<sup>5</sup>. However, anti-inflammatory drugs can enter the fetal circulation through the placenta and show toxic effects in various tissues and organs. In this context, they can cause significant side effects and even malformations in fetuses and newborns<sup>6</sup>. Kinesiotaping (KT) is another treatment method used for musculoskeletal disorders. It facilitates motion and circulation, raises the skin and subcutaneous interstitial tissues, reduces pain and inflammation, improves performance, increases neuromuscular re-education, accelerates recovery, and prevents injury<sup>7</sup>. Kinesiotape is used as a painless and non-invasive treatment tool in low back pain in pregnant women<sup>8,9</sup>. To the best of our knowledge, no studies have evaluated KT in the treatment of SIJ pain in pregnant women. Therefore, in this study, we aimed to determine the efficacy of KT in the treatment of SIJ pain in pregnant women.

## **Material and Method**

### *Study design and participants*

We conducted this randomized clinical trial with a follow-up of 5 weeks at Necmettin Erbakan University's Physical Medicine and Rehabilitation Department Hospital Outpatient Clinic between November 2019 and September 2020. A total of 58 consecutive pregnant women with low back pain were screened for acceptance into the study. Fifty patients met the eligibility criteria and were randomized into two groups as the sham KT group and the KT group (Figure 1). Exercises such as quadriceps stretching, hip adductor stretching, hip adductor isometric exercise, and trunk rotation for sacroiliac pain were assigned to both groups as a home program. Patients were encouraged to exercise regularly during the course of the weekly KT applications. The diagnosis of SIJ pain was based on tenderness localized to the posterior inferior iliac spine bilaterally with provocative maneuvers of the SIJ in posterior pelvic pain provocation/thigh thrust test, compression test, Gaenslen's test, and Patrick's Faber test eliciting considerable pain <sup>10</sup>. Positive results from at least three of those provocative tests signified the presence of SIJ pain. Exclusion criteria included a history of rheumatic disease, lumbar spine disc herniation or back injury, previous lumbar spine surgery, scoliosis, twin pregnancy, and negative diagnostic tests for SIJ pain. The Necmettin Erbakan University Faculty of Medicine's Ethics Committee approved the study protocol (protocol no: 2634). Written informed consent was obtained from all pregnant women. This study was not recorded in international databases as it was not systematic in the country at the time of the study.

As part of the KT protocol, the initial position of the kinesiotape was the location of lumbar spine flexion. A long I-shaped piece of tape was applied with 80% tension transverse to the patient's painful area and the bilateral SIJ region, with no tension applied to the ends of the tape. Another short piece of tape was applied with 80% tension at an angle from the painful point to the hip, and no tension was applied to the ends of the tape (Figure 2). An identical

application was performed on the other side of the sacroiliac region <sup>11</sup>. This KT procedure was repeated once a week for 5 weeks. In the sham KT group, kinesiotape was applied to the sacroiliac region without tension (Figure 3). The tape (Kinesio Tex, Kinesio Taping, USA) used in this study was adhesive, porous, and waterproof.

Concealed allocation of the subjects was carried out using a computer-generated randomized table of numbers created prior to the start of the study. All outcome measures were gathered by the same researcher, who was blinded to the patient group assignment at the initiation of the study and at the 5-week follow-up.

### ***Outcome measures***

Pain levels were evaluated using a horizontal visual analogue scale (VAS) of 100 mm both before and after treatment.

Functional ability and disability were measured using the Turkish version of the Roland-Morris Disability Questionnaire (RMDQ) <sup>12</sup>. The RMDQ is a 24-item questionnaire measuring the individual's daily life in relation to painful symptoms of the spine. Answers of "yes" receive 1 point while "no" receives 0 points. The total score is between 0 and 24 with higher scores indicating greater disability.

The Pelvic Girdle Questionnaire (PGQ) was also applied. It was created by Stuge et al. <sup>13</sup> to assess quality of life in cases of pelvic girdle pain during pregnancy and postpartum. It includes 25 questions, with 20 questions aiming to assess activity and 5 questions examining symptoms. Each question is scored on a 4-point Likert-type scale (from "no problem at all" (0 points) to "to a large extent" (3 points)). The raw scores are then converted into a final score ranging from 0 to 100 (from best to worst outcomes). The questionnaire's reliability and validity in Turkish have been confirmed <sup>14</sup>.

## **Statistical Analyses**

SPSS 17.0 for Windows (SPSS Inc., Chicago, IL, USA) was used for statistical analysis. The compliance of the data obtained from the measurements to normal distribution was examined with the Kolmogorov-Smirnov test and it was observed that the data of both groups showed a normal distribution. Descriptive data were presented as mean  $\pm$  standard deviation. Clinical and demographic characteristics were compared using the chi-square test. The paired samples t-test was used to compare dependent variables and the independent samples t-test was used to compare parametric data between groups. Values of  $p < 0.05$  were considered statistically significant.

## **Results**

The KT and sham KT groups were similar in terms of age, parity, gravidas, gestational week, and body mass index (Table 1). At the beginning of the study, there were no significant differences between the two groups for VAS, RMDQ, or PGQ scores. Five weeks later, the KT group had significant improvement in all parameters ( $p < 0.05$ ), (Table 2) but no statistically significant differences were observed for the sham KT group in VAS, RMDQ, or PGQ scores (Table 2).

## **Discussion**

Although the mechanisms leading to sacroiliac dysfunction are not clear, hormonal, metabolic, traumatic, and degenerative factors are considered in its etiology <sup>1</sup>. Sacroiliac dysfunction is an important problem during the course of pregnancy, with increasing pain intensity and mobility problems from the beginning to the end of pregnancy <sup>15</sup>. Therefore, optimal treatment should be used to reduce pain and disability in pregnancy.

Previous studies have evaluated the effects of exercises <sup>16,17</sup>, water exercises <sup>18</sup>, acupuncture <sup>18</sup>, use of a wedge-shaped pillow <sup>18</sup>, mobilization <sup>18,19</sup>, use of a sacroiliac belt <sup>18,20</sup>, and patient education and advice on ergonomic issues <sup>18,20</sup> for back pain in pregnancy. These treatments have been found to be effective in women with back pain, but their role in reducing SIJ pain during pregnancy remains uncertain. Using specific diagnostic criteria for sacroiliac dysfunction, in a study conducted with 118 pregnant women, it was found that pelvic stabilization exercises did not reduce pain severity and did not shorten the recovery time after delivery <sup>21</sup>. Similarly, in a randomized controlled study conducted by Mens et al., among 44 postpartum patients with pain in the sacroiliac region, it was found that there was no change in pain intensity or pelvic joint movements of the exercise group compared to the control group <sup>22</sup>. In contrast to previous studies, Filipec et al. reported that therapeutic exercise provided significant improvements in the pain and disability of pregnant patients with SIJ pain <sup>23</sup>.

On the other hand, KT may be an effective and tolerable method for pregnant women. KT is a non-invasive and painless stimulation that increases muscle activity, decreases abnormal muscular tension, and does not interfere with the full range of motion <sup>24</sup>. Şeyhmus et al., in a randomized controlled trial including 65 patients with pregnancy-related low back pain, found paracetamol plus KT to be more useful than paracetamol treatment alone <sup>9</sup>. In a randomized controlled study conducted by Kalinowski et al., among 106 pregnant patients with low back pain, it was found that there was significantly decreased pain intensity and disability in the KT group compared to the control group <sup>8</sup>. Those authors found that the effectiveness of the treatment started on the second day and continued after the KT treatment had ended <sup>8</sup>. Similarly, in the study of Sabbour et al., 60 primiparous women in the third trimester of pregnancy were included. The participants were randomized into two groups. While the first group only underwent exercise therapy, the second group performed exercises and underwent

KT. Patients' pain, angle of lordosis, and functional status were respectively evaluated with a VAS, flexible ruler, and the Oswestry Disability Index. These authors showed that KT and pelvic tilting exercises are safe and effective treatment methods for low back pain in late pregnancy <sup>25</sup>. However, in all of these studies, physical examination was not performed to determine the type of low back pain.

In only one study in the literature were patients with low back pain included using physical examination tests specific to pelvic girdle pain. Kinesiotape was applied to the lumbar region for 5 days for pregnant patients; a significant reduction in pain was detected on the 3rd day of the application and its effectiveness continued for 5 days after the removal of the kinesiotape. It was stated that the short duration of kinesiotape application and the lack of a placebo control group were the limitations of the study <sup>26</sup>.

To our knowledge, there are no articles in the literature evaluating the effectiveness of KT treatment of SIJ pain in pregnant women. All of the articles in the literature are about pregnancy-related low back pain. However, we know that the most important cause of pregnancy-related low back pain is specifically SIJ dysfunction. The most important feature that distinguishes our study from other studies is that provocation tests were applied to pregnant women for the diagnosis of sacroiliac dysfunction. The prevalence of pregnancy-related SIJ dysfunction has been reported to range from 24% to 90%. In cases of SIJ dysfunction, pain is the most important symptom causing disability and limitations in daily life activities <sup>1</sup>. Treatment options during pregnancy for reducing pain and increasing the quality of life are very limited. However, KT is a very safe, painless, and effective treatment method in pregnant women. The small sample size is the most important limitation of the present study.

## **Conclusion**

In our study, significant improvement was found in pain and disability in pregnant women with SIJ dysfunction when the KT group was compared to the sham KT group.

## **Ethical disclosure**

The study was approved by the local research ethics committees of Necmettin Erbakan University's Medical Faculty (No: 2634).

All procedures performed in the studies involving human participants were in accordance with the ethical standards of the institutional and national research committee and with the 1964 Helsinki declaration.

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## **Disclosure of interest**

The authors declare that they have no competing interests.

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## **Authors' contributions**

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Acquisition of data: BO

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### **Data Availability Statement**

Author elects to not share data

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**Figure 1 Flow diagram**

**Figure 2 Kinesiotape protocol**

**Figure 3 Sham kinesiotape protocol**

**Table 1 Comparison of clinical characteristics of pregnant women with sacroiliac dysfunction**

**Table 2 Assessment of VAS, RMDQ and PGQ values before and after treatment between and within groups**

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