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# Prevalence of sacroiliac dysfunction during pregnancy

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**ABSTRACT**

**Objective**. To estimate the prevalence of sacroiliac dysfunction during pregnancy in Egypt.
**Materials and Methods**. This was a cross-sectional observational study recruiting 861 pregnant women who attended the Obstetrics and Gynecology Department's outpatient clinic at Suez Canal University Hospitals from August 2016 to March 2020. Pain provocation tests were performed, including distraction test, Patrick Faber test, posterior pain provocation test, compression test, and active straight leg raising test. The reference criteria of three or more positive pain-provoking tests have high validity for the diagnosis. The primary outcome measurement was the prevalence of sacroiliac dysfunction during pregnancy.
**Results.** 861 pregnant women were involved in this study, with 26.2 ± 6 years. The distraction test, Patrick Faber test, and posterior pain provocation test were the most positive tests (59.1%, 57.1%, and 51%, respectively). Three hundred twenty-four cases were found to have three or more positive pain provocation tests. The prevalence of sacroiliac dysfunction was 37.6%.
**Conclusions.** Sacroiliac dysfunction commonly occurs among pregnant women in Egypt.

## INTRODUCTION

Low back and pelvic pain are common complaints among pregnant ladies in many cultures [1, 2]. Most of them reported their first episode of low back pain during pregnancy, although the complaint is still underestimated [3, 4]. It results from mechanical changes and increased laxity of the sacroiliac ligaments during pregnancy due to the effect of the relaxin hormone. Sacroiliac dysfunction pain is the pain that arises from or around the sacroiliac joint and can affect the back, buttocks, groin, and lower limbs [5-7].
Despite recognizing the sacroiliac dysfunction as a primary cause of low back pain, diagnostic tools, and treatment options [8-10], it still has a prevalence of 35 to 98% [11].
There is no reliable data about the prevalence of sacroiliac dysfunction in Egypt, nor how to diagnose it during pregnancy. So, this work aimed to establish the prevalence of sacroiliac dysfunction among pregnant women in Egypt.

## MATERIALS AND METHODS

This cross-sectional observational study was carried out at the Obstetrics and Gynecology department between August 2016 to March 2020. The study recruited 861 pregnant women according to predetermined inclusion and exclusion criteria. Inclusion criteria included: 1) age from 18-45, 2) pregnant in singleton or multifetal gestation, 3) pregnant in first, second or third trimesters, 4) presented for antenatal care, 5) primiparous or multiparous women, and 6) mode of delivery either vaginal or caesarean delivery. Exclusion criteria were 1) history of pelvic fractures or orthopaedic pelvic surgeries, 2) history of degenerative orthopaedic diseases (osteoarthritis or rheumatoid arthritis), 3) history of autoimmune diseases and 4) refusal to participate in the study.

At the enrolment visit, complete medical history was obtained, including age, job, parity, gestational age in weeks, and evidence of chronic illness. Each participant was examined clinically using five clinical tests to assess pain. Pain provocation tests were performed, including distraction test, Patrick Faber test, posterior pain provocation test, compression test, and active straight leg raising test [12]. The reference criteria of three or more positive pain-provoking tests have high validity (85-94% sensitivity, 76-78% specificity, and diagnostic odd's ratio 17.16) [13, 14].

In the posterior pelvic pain-provoking test, the woman lay supine on the table. Standing at the side of the table, the examiner flexed the ipsilateral leg to approximately 90° hip flexion while the knee remained relaxed. The examiner applied a graded force through the long axis of the femur, causing posterior shearing stress in the sacroiliac joint [10].

In the distraction test the examiner placed each hand over each anterior superior iliac spine. On the other hand, spread the ASIS apart to try and compress the sacroiliac joint.

A test was considered positive when there was a pain in the sacroiliac joint. This test has 60% sensitivity and 81% specificity [12].

In the compression test the woman lay on her side, and the examiner remained in front of her. The pelvis applied pressure as the examiner compressed his hands against the upper iliac crest. The test was assumed to stretch the posterior sacroiliac ligaments or compress the anterior part of the sacroiliac joint – this test had a sensitivity of 14% and specificity of 100% [12].

In Patrick's Faber test the woman was in a supine position. One leg was flexed, abducted, and rotated out so that the heel rested on the opposite knee cap. If the test resulted in pain on the medial side of the knee and femur or in the inguinal region, this indicates the test was positive. Patrick's Faber test has a 40% and 99% sensitivity and specificity, respectively [10].

In active straight leg raising test, widening the pubic symphyses as a forward rotation of the innominate on the side of the passively hanging leg is clear. The load transfer test or the active straight leg (ASLR) test has 87% sensitivity and 94% specificity [15].

The same physician performed these tests. After completing the five tests, an interview was done with the positive results of patients (participants with sacroiliac dysfunction) filling out a questionnaire for function assessment (Roland and Morris questionnaire, RMQ). It is a short and straightforward measurement tool designed to assess physical disability due to low back pain. It focuses on specific items of physical functions, such as walking, bending over, sitting, lying down, dressing, sleeping, self-care, and daily activities [16]. We used the Arabic-validated version [17]. The scale is formed of 24 items, and the patient was instructed to mark only in front of an appropriate statement describing her condition. Add up the total number of determined statements to get a score ranging from 0 to 24 [18].

Data collection was done by one of the study researchers, who had interviews with each patient and was blinded to the results of pain provocation tests. Women were interviewed in a private room. The questionnaire was anonymous and without address to ensure confidentiality. The available researcher provided help and clarification for patients when needed. The average time for filling out the questionnaire was 15-20 minutes.

The primary outcome was estimating the prevalence of sacroiliac dysfunction among pregnant women.

### *Statistical analysis*

Gathered data were processed using SPSS version 22 (SPSS Inc., Chicago, IL, USA). Quantitative data were expressed as means ± SD, while qualitative data were expressed as numbers and percentages (%). Student t-test was used to test the significance of difference for quantitative variables, and Chi-Square was used to test the significance of difference for qualitative variables. A probability value (P-value) < 0.05 was considered statistically significant.

## RESULTS

Nine hundred ninety- one women were eligible for the study. One hundred and thirty women declined to participate in the study, leaving a total number of 861 for the final analysis.

Age ranged from 16 to 50 years, with 26.2 ± 6.7 as the mean. Most of them were younger than 25 years (53.5%), not working (82.2%), had no evidence of chronic illness (96.5%), in the second trimester (38.7%), had a singleton pregnancy, multipara (82.2%) and delivered vaginally (54.9%) (**Table 1**).

The distraction test, Patrick Faber test, and posterior pain provocation test were the most positive tests reported during examination (59.1%, 57.1%, and 51%, respectively) (**Table 2**).

Since the diagnosis of sacroiliac dysfunction during pregnancy depends on the diagnostic criteria of 3 or more positive pain-provoking tests, 324 cases were found to have sacroiliac dysfunction. Accordingly, the prevalence of sacroiliac dysfunction was 37.6%.

Women with SID had advanced age, gestational age, and increased parity than those without (P-value < 0.001 for all) (**Table 3**).

**Table 1.** *Demographics.*

| Characteristic | Number = 861 | Percent |
|---|---|---|
| Age in years | | |
| < 25 | 461 | 53.5% |
| 25-35 | 298 | 34.6% |
| > 35 | 102 | 11.8% |
| Occupation | | |
| Not employed | 708 | 82.2% |
| Employed | 153 | 17.8% |
| Chronic illness | | |
| No chronic illness | 831 | 96.5% |
| Hypertension | 16 | 1.9% |
| Diabetes mellitus | 14 | 1.6% |
| Gestational age in weeks | | |
| 1st trimester (≤ 14 wks) | 285 | 33.1% |
| 2nd trimester (> 14-28 wks) | 333 | 38.7% |
| 3rd trimester (> 28 wks) | 243 | 28.2% |
| Number of foetuses | | |
| Singleton pregnancy | 842 | 97.8% |
| Multifetal pregnancy | 19 | 2.2% |
| Parity | | |
| Primigravida | 153 | 17.8% |
| Multipara | 708 | 82.2% |
| Mode of previous deliveries | | |
| Normal vaginal delivery | 389 (n = 708) | 54.9 % |
| Caesarean sections | 319 (n = 708) | 45.1% |

**Table 2.** *Pain provocation and load transfer tests results (n = 861).*

| Test name | Negative test n (%) | Positive test n (%) |
|---|---|---|
| Posterior pain provocation test | 422 (49%) | 439 (51%) |
| Distraction test | 352 (40.9%) | 509 (59.1%) |
| Compression test | 488 (56.7%) | 373 (43.3%) |
| Patrick-Faber test | 369 (42.9%) | 492 (57.1%) |
| Active straight leg raising test | 484 (56.2%) | 377 (43.8%) |

## DISCUSSION

The prevalence of SID was 37.6% in the current study. The prevalence of Sacroiliac dysfunction in the general population varies from 0.4% to 35% to 98% [8, 19, 20]. Malmqvist found that 29% of pregnant women had experienced pelvic girdle pain in a study describing the association between pelvic girdle pain and sick leave during pregnancy [21]. Only 7% of the studied population and 16.7% of sacroiliac dysfunction patients presented with low back pain as the primary complaint, while the great majority (53.4%) presented with regular antenatal care. It could be explained that low back pain was not the main problem for pregnant women in Egypt, and most of them were dealing with it as a usual manifestation of pregnancy.

Most of the patients diagnosed with SID were under 25 (42%), while the prevalence was lowest in the age group above 35 years (20.4%). It agrees with previous studies documenting sacroiliac pain was associated with young maternal age [22-24]. Contradictory results showed that sacroiliac dysfunction increased with maternal age [25]. It may be due to the degenerative changes occurring to the joints' articular parts, especially the sacroiliac joint, with increased age; the iliac facet is the most liable part for degenerative changes [26]. Such conflict could be explained by the small percentage of participants aged above 35 years *versus* a large group aged under 25.

Sixteen participants reported hypertension (chronic or gestational); seven of them had been diagnosed with sacroiliac dysfunction with a percent of (43.7% of hypertensive patients). It was agreed by other investigators who reported that venous

**Table 3.** *Demographic data and sacroiliac dysfunction.*

| Characteristic | Sacroiliac dysfunction n (%) | No sacroiliac dysfunction n (%) | P-value |
|---|---|---|---|
| Age in years | | | |
| < 25 | 136 (42%) | 325 (60.5%) | < 0.001[1*] |
| 25-35 | 122 (37.7%) | 176 (32.8%) | |
| > 35 | 66 (20.4%) | 36 (6.7%) | |
| Chronic Illness | | | |
| Hypertension | 7 (43.7%) | 9 (56.4%) | 0.001 |
| Diabetes mellitus | 12 (85.7%) | 2 (14.3%) | |
| Gestational age in weeks | | | |
| 1st trimester (< 14 wks) | 21 (6.5%) | 264 (49.2%) | < 0.001[1*] |
| 2nd trimester (>14-28 wks) | 133 (41%) | 200 (37.2%) | |
| 3rd trimester (>28 wks) | 170 (52.5%) | 73 (13.6 %) | |
| Number of foetuses | | | |
| Singleton pregnancy | 317 (97.8%) | 525 (97.8%) | 0.943[1] |
| Multifetal pregnancy | 7 (2.2 %) | 12(2.2 %) | |
| Parity | | | |
| Primigravida | 28 (8.6%) | 125 (23.3%) | < 0.001[1*] |
| Multipara | 296 (91.4%) | 412 (76.7%) | |
| Mode of last delivery | | | |
| Number | 294 | 414 | |
| Normal vaginal delivery<br>Caesarean sections | 135 (45.9%)<br>159 (54.1%) | 254 (61.4%)<br>160 (38.6%) | < 0.001[1*] |

congestion and hypoxia in the pelvic and lumbar spine during pregnancy, related to the pressure by the gravid uterus, exaggerated the low back pain experienced by pregnant women [27].

Twelve diabetic women had sacroiliac dysfunction (85.7%). It has been reported that pelvic girdle pain (including sacroiliac pain) was associated with some metabolic conditions such as diabetes. A mechanical factor could explain the correlation between diabetes mellitus and sacroiliac dysfunction during pregnancy by increased foetal weight (macrosomia) in diabetic pregnant women. Also, hormonal changes exerted by diabetes mellitus (increased insulin-like growth factors I, II, growth hormone, and relaxin hormone) have profound effects on connective tissues [28, 29].

There was a positive correlation between the prevalence of sacroiliac dysfunction and the advance in the gestational age. This correlation could be explained by fast mechanical changes that happen in a short period (course of pregnancy), increasing the chance of developing sacroiliac dysfunction. Increasing foetal and maternal weight increases mechanical stress on the pelvis and lower back [30]. Laxity of the sacroiliac ligaments increased due to relaxin, which increased by ten folds in pregnancy, decreased rigidity of collagen, and increased softening of the sacroiliac joint's ligaments. As a result sacroiliac joint becomes less stable and more mobile [5, 31].

The prevalence of sacroiliac dysfunction was higher in multiparous women. Many factors may explain it: 1) the cumulative effect of previous pregnancies on the sacroiliac joints, 2) the effect of the advance in age associated with repeated pregnancies, 3) the associated medical and obstetric disorders related to the maternal age and multiparous or even grand multiparous [29, 31]. Additionally, significant sacroiliac degenerative changes occurred in multiparous women; these changes were irreversible after delivery [32, 33].

Our study noted that 54.1% of SID participants were delivered by caesarean section (CS). An earlier study found a high prevalence of pelvic girdle pain in women who had caesarean delivery than in those who had a vaginal delivery, but even that study recommended further research in this area to get definitive conclusions [34]. The resulting adhesions due to abdominal surgery could contribute to lower abdominal pain in the subsequent pregnancy [35].

### *Strength and limitations*

According to our knowledge, this was the first study to determine the prevalence of SID among

pregnant women in Egypt. We depended on five pain provocation tests to diagnose SID. The sample size was large. However, the few comparable studies in the literature were a conflict with a detailed explanation.

## CONCLUSIONS

Our study showed that sacroiliac dysfunction affected a large portion of the pregnant ladies in our community.

## COMPLIANCE WITH ETHICAL STANDARDS

### *Authors contributions*

M.A.H.: Data collection and management, writing – original draft, writing – review & editing. W.A.S.A., O.A.S: Protocol/project development, data collection. A.M.E.: Protocol/project development. O.T.T.: Data management

### *Funding*

None.

### *Study registration*

N/A.

### *Disclosure of interests*

The authors declare that they have no conflict of interests.

### *Ethical approval*

This study was conducted after approval of the Research Ethics Committee at the Faculty of Medicine at Suez Canal University.

### *Informed consent*

Obtained from each participant in the study.

### *Data sharing*

Data are available under reasonable request to the corresponding author (and Research Ethics Committee approval).

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