The Assessment of Musculoskeletal Disorders of Pregnancy

Ahmadreza Afshar

Urmia University of Medical Sciences

Ali Tabrizi

Urmia University of Medical Sciences

Vahid Bagheri

Urmia University of Medical Sciences

Amin Sedokani (✉ a.sedokani@gmail.com)

Urmia University of Medical Sciences

Research Article

Keywords: Musculoskeletal disorder, Pregnancy, Back Pain, Carpal Tunnel Syndrome, Wrist Pain

Posted Date: August 6th, 2021

DOI: <https://doi.org/10.21203/rs.3.rs-701615/v1>

License: © ⓘ This work is licensed under a Creative Commons Attribution 4.0 International License.

[Read Full License](#)

Abstract

Background

Almost all women experience some degree of musculoskeletal disorder during pregnancy, and almost a quarter of them develop at least temporarily musculoskeletal disorders during pregnancy. The most common of which is lower back pain, which affects half of all pregnant women. In this study, we aimed to determine the prevalence of musculoskeletal disorders caused by pregnancy in women referred to Motahari Hospital of Urmia.

Methods

The present study is a cross-sectional study in which 344 pregnant patients referred to Motahari and Imam Hospitals of Urmia during 2020 were studied. The demographic factors and pregnancy characteristics of patients were recorded and evaluated. Patients were also questioned and examined using a questionnaire. The relationship between demographic factors and the frequency of various skeletal abnormalities was investigated.

Results

The mean age of patients and the mean gestational age were 27 ± 4.76 years and 22 ± 3.4 weeks, respectively. The analysis of the relationship between age, gravid and parity of pregnant women with the prevalence of complaints and clinical examination findings, indicated women with gravid 4 or more had more complaints of back pain ($p\text{-value} = 0.021$). It was also found that there is a statistical relationship between the increase in body mass index of patients and the frequency of wrist pain and carpal tunnel syndrome in the study population ($p\text{-value} = 0.03$).

Conclusions

The present study indicated the rate of musculoskeletal complaints of patients and pathological factors such as lumbar hyperlordosis in women with higher gravidity is higher than other groups of pregnant women. Larger body mass index is associated with more wrist pain and carpal tunnel syndrome.

Background

Gender-appropriate care for musculoskeletal disorders is one of the most important factors in women's health [1]. It is estimated almost all women experience some degrees of musculoskeletal disorder during pregnancy, and a quarter of them develop at least temporarily musculoskeletal disorders during pregnancy [2]. The most common of these disorders is lower back pain, which affects about half of all pregnant women. Other common disorders include pelvic pain, upper or lower limb pain, and peripheral

neuropathy [3]. Soft tissue edema occurs in approximately 80% of women during pregnancy. Increased fluid retention can predispose a person to tenosynovial or nerve cramps [4]. Tendon weakness is another physiological change that occurs during pregnancy that is associated with the production of the hormones relaxin and estrogen. Relaxin is a substance that is secreted during pregnancy and causes changes in pelvic connective tissue and activates the collagenolytic system [5]. Studies suggest that there may be an association between serum relaxin levels and low back pain or symphyseal pain [6]. The widening of the symphysis pubis begins at 10 to 12 weeks of gestation under the influence of relaxin and may be related to the pain of this period. It is normal for the pubic symphysis to expand to 10 mm during pregnancy [7]. Weight gain during pregnancy, along with weakened ligaments, may be associated with joint disorders. It must be noted 20% weight gain during pregnancy increases the force exerted by the joints by up to 100% [8]. Pregnancy hyperlordosis may be the result of increased force exerted by the induction of excess weight from the uterus or the concentration of the anterior pelvic region. The sacroiliac joints resist this forward rotation. As the pregnancy progresses, forward rotation and increased hyperlordosis and weakening of the sacroiliac ligaments lead to increased mechanical pressure on the back, sacroiliac, and pelvis [2].

Skeletal problems during pregnancy include: I. Pregnancy pelvic pain refers to a range of disorders of the pelvic area and is mainly due to increased movement due to loosening of the ligaments [9]. II. Inflammation of the pubis, caused by bone resorption around the symphysis, is characterized by progressive pain in the pubic area and worsens with movement [10]. III. Rupture of the symphysis pubis is a true rupture of the ligaments supporting the symphysis pubis and is rare [11]. IV. Low back pain, which studies have shown, occurs in 50% of pregnant women and is associated with increasing maternal age, a history of low back pain in previous pregnancies, and a higher body mass index [12]. V. Osteoporosis and stress fractures due to bone resorption during pregnancy [13, 14]. VI. Disc herniation and sciatica, which occur in approximately 1% of pregnancies [15]. VII. Pregnancy hyperlordosis, which may be the result of increased force induced by the induction of excess weight from the uterus or the concentration of the anterior pelvic region [1].

So far, very few studies have been done in the world to determine musculoskeletal problems during pregnancy; Also, no such study has been conducted in Iran. Obtaining empirical evidence to determine the prevalence of skeletal disorders caused by pregnancy can lead to our greater knowledge of the occurrence of these complications and can provide a good background for further studies. The present study investigates skeletal disorders in pregnant women referred to Urmia University of Medical Sciences hospitals. We hope that the results of the present study can lead to a better orientation of our treatment.

Methods

In this descriptive-analytical study, all pregnant women who referred to the gynecology clinic Motahari Hospital and Clinic of Imam Hospital (two central study) of Urmia during 2020 were included in the study by accidental or opportunity sampling method. All patients completed a questionnaire containing

demographic and clinical information, then underwent physical examinations after obtaining written consent of participation.

The information in this checklist included the following: First, information about pregnancy, including type of delivery, gravid and parity was recorded. Weight mass (body mass index) of pregnant women was determined by calculation with standard formula (kg/m^2). Then, information about deformities and skeletal disorders including two groups of spinal and pelvic disorders and disorders related to upper extremities and peripheral neuropathy were recorded. Patients were then clinically examined for the presence or absence of hyperlordosis. To evaluate the presence or absence of pubic symphysis rupture, osteoporosis, stress fractures, disc herniation and also the patient's clinical record were studied. Finally, statistical studies were performed.

Data analysis

In this study, descriptive statistical methods including central indices and dispersion (mean $\pm$ standard deviation) were used. Also, logistic regression model was used to investigate the relationship between body mass index, gravid and parity, and age with the incidence of skeletal disorders. Univariate tests including Chi-square test (if necessary, Fisher test) were used to compare the frequency of qualitative variables and Independent T-test was used to compare the means. The p-value of < 0.05 considered as significance level. SPSS V.21 software was used for statistical analysis.

Results

Demographic data

The age range of 344 pregnant patients under study was 21 to 45 years and the mean age of these patients was 27 ± 4.76 years. The gestational age of patients was 18 weeks to 38 weeks and the mean gestational age was 22 ± 3.4 weeks. The number of nulliparous pregnancies was 101 patients (29.3%) and gravidity of 4 or more was positive in 28 patients (8.14%). There were no cases of twin pregnancies among patients.

Gravid and parity

Examining the relationship between age, gravid and parity of pregnant women with the incidence of carpal tunnel syndrome and complaints of wrist, elbow and shoulder pain, it was found that there is no statistically significant relationship between these factors (p-value = 0.56) and it is not possible to have high gravid or parity. It is not possible to judge whether high gravid or parity is associated with a higher rate of carpal tunnel syndrome or complaints of limb pain, although our data have shown that women with gravid 4 or more complained significantly more of low back pain (p-value = 0.021).

Body Mass Index

The mean body mass index of patients under study was measured as $24.3 \pm 2.76 \text{ kg/m}^2$; Thus, out of 344 pregnant women, body mass index of 171 women (49.7%) were in range of $18.5\text{--}24.9 \text{ kg/m}^2$, 140 patients (40.7%) in range of $25\text{--}29.9 \text{ kg/m}^2$, 28 patients (8.1%) had BMI of over 30 kg/m^2 and 5 patients (1.45%) had BMI of less than 18.5 kg/m^2 . In determining the relationship between body mass index and the frequency of peripheral neuropathy (carpal tunnel syndrome) and wrist, elbow, and shoulder pain in pregnant women, it was found that there is a statistically significant relationship between increased body mass index and the frequency of wrist pain and carpal tunnel syndrome is significantly more common in overweight or obese women ($\text{BMI} < 25$) ($p\text{-value} = 0.03$).

Complaints and Clinical findings

Patients were interviewed for pelvic, wrist, elbow, shoulder and back pain and after collecting information, they were classified based on complaints. Table 1 shows the frequency of different types of patient complaints.

Table 1
Frequency of complaints, deformities and skeletal disorders in patients.

Complaints	Frequency (%)	Examinations	Frequency (%)
Pelvic Pain	60 (17.4%)	Hyperlordosis	40 (11.6%)
Wrist Pain	34 (9.9%)	Symphysis Opening	8 (2.4%)
Elbow Pain	48 (13.9%)	Disc Herniation	40 (11.6%)
Shoulder Pain	37 (10.7%)	Peripheral Neuropathy	23 (6.7%)
Low Back Pain	150 (43.7%)	Normal Examination	233 (67.7%)
Pelvic & Low Back Pain	15 (4.4%)		

All patients underwent clinical examination and were evaluated for hyperlordosis, pubic symphysis opening and disc herniation. Patients were also examined for signs of paresthesia and diastasis in the limbs. Table 1 shows the frequency of various deformities and skeletal disorders in the clinical examination of the studied patients. In the assessment of the relationship between women's age and gravid and parietal and the frequency of pubic symphysis rupture, disc herniation and hyperlordosis in pregnant women, it was found that there was no statistically significant relationship between patients' age and the mentioned clinical findings ($p\text{-value} = 0.06$). However, the number of gravid had a statistically significant relationship with hyperlordosis in patients ($p\text{-value} = 0.004$) and women with gravid 4 and more had significantly more hyperlordosis.

Discussion

Joint pain and skeletal abnormalities during pregnancy can cause a significant decrease in the mother's physical abilities during pregnancy and even make it difficult for her to perform daily tasks. Especially since women are more prone to bone diseases than men, and in many cases, latent skeletal and joint diseases in women are exacerbated by pregnancy or breastfeeding and appear for the first time [16]. Women's center of gravity shifts during pregnancy due to the effect of fetal weight, and pregnant women tend to bend their backs too much to counteract the effects of fetal weight, which increases the pressure on the spine and lumbar discs, which can cause joint damage or pain. A study by Olson et al. found that maternal weight during pregnancy and delivery is not directly related to low back pain [17]. Researchers speculate that changes in the soft tissue laxity surrounding the joints due to hormonal changes during pregnancy are the cause of the pregnancy musculoskeletal pains [16].

In the assessment of the relationship between age, gravid and parity of pregnant women with the prevalence of carpal tunnel syndrome and complaints of wrist, elbow and shoulder pain, it was found that there is no statistically significant relationship between these factors, and it cannot be said that gravid or parity is associated with a higher incidence of carpal tunnel syndrome or a complaint of limb pain or not. Although our study indicated that women who had gravid 4 or more complained of significantly more back pain. This finding of our study was consistent with the findings of similar studies [16, 18].

Findings of our study on the relationship between high body mass index and wrist pain and carpal tunnel syndrome were consistent with similar studies [19]. The assessment of the relationship between women's age and gravid and parietal and the frequency of pubic symphysis rupture, disc herniation and hyperlordosis in pregnant women, it was found that there was no statistically significant relationship between patients' age and the mentioned clinical findings. However, the number of gravid had a statistically significant relationship with hyperlordosis in patients and women with gravid 4 and more, had significantly more hyperlordosis. Standing on your feet for long periods of time and engaging in strenuous physical activity during pregnancy can clearly cause muscle cramps and pain in the spine and pelvis [19].

The present study showed that the rate of musculoskeletal complaints of patients and pathological factors such as lumbar hyperlordosis in women with higher gravid, especially 4 and more is higher than other groups of pregnant women. It must be said almost half of these complaints are treated with advice to rest or use simple analgesics. Also, how to keep the spine in the correct posture, whether standing or sitting, should be explained in detail to the patient and the patient should be taught the types of exercises available to reduce joint pain and pressure [15, 16, 20, 21].

Conclusion

The present study indicated the rate of musculoskeletal complaints of patients and pathological factors such as lumbar hyperlordosis in women with higher gravidity is higher than other groups of pregnant women. Larger body mass index is associated with more wrist pain and carpal tunnel syndrome.

Declarations

Ethics approval and consent to participate

The participation of pregnant women was completely voluntary and the information of all patients remained confidential, oral and written consent of participation and publication were obtained prior to study. The project was started after receiving the code of ethics from the ethics committee of Urmia University of Medical Sciences, and all the ethical principles of working with the human sample have been observed in the research projects specified in the Helsinki Convention in this study. The ethical registration code of the study is [IR.UMSU.REC.1399.010](#).

Consent for publication

The consent for publication has been obtained from the patient, or legal guardian.

Availability of data and materials

The datasets used and/or analyzed during the current study are available from the corresponding author on reasonable request.

Competing interests

There was no kind of financial or non-financial competing interests for any of authors, other people or any organization in this study

Funding

This study received no kind of funding from any organization.

Authors' contributions

V.B. and A.S. have contributed equally in data collection, data analysis and writing of the original manuscript. A.A. and A.T. contributed to study supervision, analysis and review of the final manuscript.

Acknowledgements

We would like to appreciate all patients and staff of Imam and Motahari hospitals of Urmia and Urmia University of Medical Sciences for participating and helping in this study.

References

1. Borg-Stein J, Dugan SA: **Musculoskeletal disorders of pregnancy, delivery and postpartum.** *Physical medicine and rehabilitation clinics of North America* 2007, **18**(3):459–476.
2. Ritchie JR: **Orthopedic considerations during pregnancy.** *Clinical obstetrics and gynecology* 2003, **46**(2):456–466.
3. Mantle M, Greenwood R, Currey H: **Backache in pregnancy.** *Rheumatology* 1977, **16**(2):95–101.
4. Massey EW, Stolp KA: **Peripheral neuropathy in pregnancy.** *Physical medicine and rehabilitation clinics of North America* 2008, **19**(1):149–162.
5. Weiß M, Nagelschmidt M, Struck H: **Relaxin and collagen metabolism.** *Hormone and Metabolic Research* 1979, **11**(06):408–410.
6. Kristiansson P, Svärdsudd K, von Schoultz B: **Serum relaxin, symphyseal pain, and back pain during pregnancy.** *American journal of obstetrics and gynecology* 1996, **175**(5):1342–1347.
7. Young J: **Relaxation of the pelvic joints in pregnancy: pelvic arthropathy of pregnancy.** *BJOG: An International Journal of Obstetrics & Gynaecology* 1940, **47**(5):493–524.
8. Calguneri M, Bird H, Wright V: **Changes in joint laxity occurring during pregnancy.** *Annals of the rheumatic diseases* 1982, **41**(2):126–128.
9. Mousavi SJ, Parnianpour M, Vleeming A: **Pregnancy related pelvic girdle pain and low back pain in an Iranian population.** *Spine* 2007, **32**(3):E100-E104.
10. Usta JA, Usta IM, Major S: **Osteitis pubis: an unusual postpartum presentation.** *Archives of gynecology and obstetrics* 2003, **269**(1):77–78.
11. Kubitz R, Goodlin R: **Symptomatic separation of the pubic symphysis.** *Southern medical journal* 1986, **79**(5):578–580.
12. Carlson HL, Carlson NL, Pasternak BA, Balderston KD: **Understanding and managing the back pain of pregnancy.** *Current women's health reports* 2003, **3**(1):65–71.
13. Maliha G, Morgan J, Vrahas M: **Transient osteoporosis of pregnancy.** *Injury* 2012, **43**(8):1237–1241.
14. Clemetson I, Popp A, Lippuner K, Ballmer F, Anderson S: **Postpartum osteoporosis associated with proximal tibial stress fracture.** *Skeletal radiology* 2004, **33**(2):96–98.
15. Ardaillon H, Laviv Y, Arle JE, Kasper EM: **Lumbar disk herniation during pregnancy: a review on general management and timing of surgery.** *Acta neurochirurgica* 2018, **160**(7):1361–1370.
16. Ather S, Mustafa A, Ayub R, Tariq Z: **Assessment of Factors Responsible for Low Back Pain Among Pregnant Women Attending Tertiary Care Hospital of Lahore, Pakistan.** 2020.
17. Olsson C, Lena N-WJAoegS: **Health-related quality of life and physical ability among pregnant women with and without back pain in late pregnancy.** 2004, **83**(4):351–357.
18. Norén L, Östgaard S, Johansson G, Östgaard HCJEsj: **Lumbar back and posterior pelvic pain during pregnancy: a 3-year follow-up.** 2002, **11**(3):267–271.

19. Osterman MJ, Martin JAJNvsrftCfDC, Prevention NCfHS, National Vital Statistics System: **Epidural and spinal anesthesia use during labor: 27-state reporting area, 2008**. 2011, **59**(5):1–13, 16.
20. Kesikburun S, Güzelküçük Ü, Fidan U, Demir Y, Ergün A, Tan AK: **Musculoskeletal pain and symptoms in pregnancy: a descriptive study**. *Therapeutic advances in musculoskeletal disease* 2018, **10**(12):229–234.
21. Chu SR, Boyer EH, Beynnon B, Segal NA: **Pregnancy results in lasting changes in knee joint laxity**. *PM&R* 2019, **11**(2):117–124.