DOI: 10.55735/hjprs.v2i4.70

THE HEALER
Journal of Physiotherapy & Rehabilitation Sciences

Original Article

Prevalence of Postural Changes During Pregnancy; A Cross-sectional Study

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ABSTRACT

Background: Pregnant women might experience a lot of physiological and anatomical changes, predominantly postural changes in their bodies. They often report low back pain, leg problems, pelvic girdle pain and urinary incontinence. Pain in the pelvis, lower back and neck might be due to alterations in spinal curvature and postural changes during pregnancy. Anatomical changes occur due to an increase in ligamentous laxity and because of the weight of the fetus during pregnancy. **Objective:** To estimate the prevalence of postural changes during pregnancy. **Methods:** This cross-sectional study is approved by the ethical committee of the college in which 113 pregnant women aged between 25 to 45 years were included in the study from different hospitals in Lahore Pakistan, after fulfilling the inclusion criteria using non-probability convenient sampling. Every pregnant woman was given a consent form and after signing that they filled out a questionnaire consisting of questions about their pregnancy, prenatal care, medical problems and pains during the trimester. The pain was rated on a visual analog scale and posture was assessed using a posture score sheet. Although pregnant women who had complications like pre-eclampsia, gestational diabetes, history of trauma, neoplasm or surgery were excluded. For baseline characteristics, percentages and frequencies were calculated. A histogram was plotted for the age variable. **Results:** In this study, 113 pregnant women with a mean age of 26.3±2.89 years were included. About 24.77% of pregnant females scored poor for lower back postural grading while 20.4% of pregnant females scored poor for upper back postural grading. **Conclusion:** This study concludes that pregnant females are more likely to develop postural changes during pregnancy due to an increase in ligamentous laxity and weight of the fetus during pregnancy. This study also suggests that the head, shoulder, spine, pelvic and hip posture tilt, head posterior position, lumbar lordosis, lumbar angle and pelvic tilt increases, although the changes and magnitudes of these posture variables are not associated with back pain.

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Key Words: musculoskeletal pain; postural changes; pregnancy; prevalence

Citation: Khan N, Waseem A, Dastgir H, Ijaz S, Khan S, Bajwa A. Prevalence of postural changes during pregnancy; A cross-sectional study. The Healer Journal of Physiotherapy and Rehabilitation Sciences. 2022; 2(4):279-286

DOI: 10.55735/hjprs.v2i4.70

INTRODUCTION

Pregnancy is a physiological miracle that is characterized by concurrent enlargement of the mother and fetus.[1,2] The development and the enlargement of the fetus results in changes in the center of mass of the mother carrying the baby and thus it brings changes in the weight distribution pattern of the mother.[2-4] This concludes that constant postural changes that are occurring during pregnancy are counterbalanced by the compensatory fluctuations in the spinal column.[3] Changes in the lumbar, thoracic curvature and pelvic tilt are the most commonly found variations during pregnancy, which unfortunately are still debatable and controversial in the literature.[5]

A lot of variations in women's physique and deviations from normal body tilts have been observed during pregnancy, which causes strain on joints and also adds weight to the abdominal area and slacking of supportive structures due to a hormone named relaxin.[6,7] During pregnancy, a lot of physical transitions are observed in the female body to fulfill the dietary needs of the fetus. An additional amount of calcium is required during the pregnancy which makes them more prone to bone loss and they might also develop osteoporosis. All this might eventually lead to musculoskeletal pain during pregnancy.[6,7]

Low back pain which is resulting from postural changes during pregnancy is the second most common neurological discomfort observed in 50 to 90 % of pregnant females in the United States of America.[8,9] Very few studies have been conducted that would have examined postural changes during pregnancy in women.[8,10] Every postural change might bring a compensatory alteration in the female's body, particularly on the lower limbs just to keep the line of gravity as close to the normal position as possible.[11] After pregnancy and giving birth returning to the pre-pregnancy state is rather impossible, especially in a relatively short period. Any postural change that had occurred during the pregnancy might last for eight months, which is damaging to the human's musculoskeletal system.[7,12] Bullock and Saxton reported that there is an increased spinal curvature observed in females for at least 2 months following their deliveries.[2,13] Since physical therapists recommend and prescribe curative and remedial exercises for pregnant females with pain in their backs, i.e. lumbar and thoracic regions, to help them deal with the pain during pregnancy and to help them to return their normal positions fast.

It is essential to find out the trends of spinal curvatures during pregnancy so that the best exercises can be chosen for their posture corrections.[14] Changes in hormonal levels have also been associated as a source of musculoskeletal discomforts, with increasing ligament laxity during pregnancy. In specific, the release of relaxin hormone has been linked with reduced collagen expression during pregnancy. Nevertheless, the particular mechanism and timing at which the changes in hormonal level and influence the postural changes during pregnancy remain unclear.[15]

Factors that are related to pregnancy and their postpartum time frame which are biomechanical might supplement to depress further changes produced on the focal point of gravity, deviation in designing of the step, gain in weight and an upsurge in how much time was spent in the side-lying position. Subsequently, the clear influence of the physical changes and changes in hormonal levels during pregnancy comes out to be biomechanically unfavorable to the lower extremity, there is a high prevalence of pain and postural changes in the lower extremity in

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pregnant women than in non-pregnant females.[16] Physiotherapy can contribute to its role in obstetrics and gynecology which might include, childbirth, gestation period and antenatal and postnatal care. It is a need for time to create awareness about the importance of physiotherapy in hospital setups among obstetricians and gynecologists so that better healthcare services can be provided to females before, during and after pregnancy.[17]

As postural changes and changes in the postural tilts are common during and after pregnancy and there is a deficiency in evidence supporting this and the prevalence of postural changes and posture tilts in pregnant females and post-partum females in Pakistan, we need more studies supporting this. So, this survey was conducted to find out the prevalence of postural changes during pregnancy in females in Lahore, Pakistan. This study aimed to find out the prevalence of postural changes, i.e., head posture, shoulders posture, spinal posture, hip posture, ankles posture, neck posture, abdominal posture, and upper and lower back postures during pregnancy.

METHODS

This is a cross-sectional study that was approved by the ethical committee and included 113 pregnant females from different hospitals in Lahore, Pakistan. Pregnant females were included after they fulfilled the eligibility criteria. Pregnant females with gestation periods of 16 – 40 weeks were included.[18] Every pregnant woman was given a consent form and after signing that they filled out a questionnaire consisting of questions about their pregnancy, prenatal care, medical problems and pains during pregnancy and which trimester are they now in. The pain was rated at the pain visual analog scale[19] and posture was assessed using a posture score sheet (good posture score 10, fair posture score 5 and poor posture score 0).[20] Pregnant women aged between 25 to 45 years were included through a non-probability convenient sampling. Although pregnant women who had complications like pre-eclampsia and gestational diabetes were excluded. Pregnant women who had a history of trauma, neoplasm, spinal, pelvic or femur surgery were also excluded. Data was analyzed using SPSS version 25. For categorical variables, percentages and frequencies were calculated. A histogram was plotted for the age variable.

RESULTS

This study included 113 pregnant females with a mean age of 26.3 ± 2.894 years (Figure I). The postural grading for the head, neck, shoulder, upper back, lower back, abdomen, spine, hips and ankles was assessed using a posture score sheet. Their grading was based on a scale of 3 where 0 means poor posture, 5 means fair posture and 10 means good posture as shown in Table I. Out of 113 pregnant females, 24 (21.2%) reported having poor head posture, 21 (18.6%) reported having poor neck posture, 22 (19.5%) reported having poor shoulders posture, 23 (20.4%) reported having poor upper back posture, 17 (25%) reported to have poor abdominal posture, 22 (19.5%) reported to have poor spinal posture, 28 (24.8%) reported to have poor lower back posture, 24 (21.2%) reported having poor hip posture and 21 (18.6%) to have poor ankle posture.

DISCUSSION

This study was intended to find out the prevalence of postural changes in pregnant females. Pregnant females are most probable to develop postural changes during pregnancy. Based on the outcome, the prevalence of postural changes during pregnancy is 24.77% in pregnant females who were presented with a mean age of 26.3 ± 2.894 years.

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Figure I: Histogram Showing Age of Pregnant Females

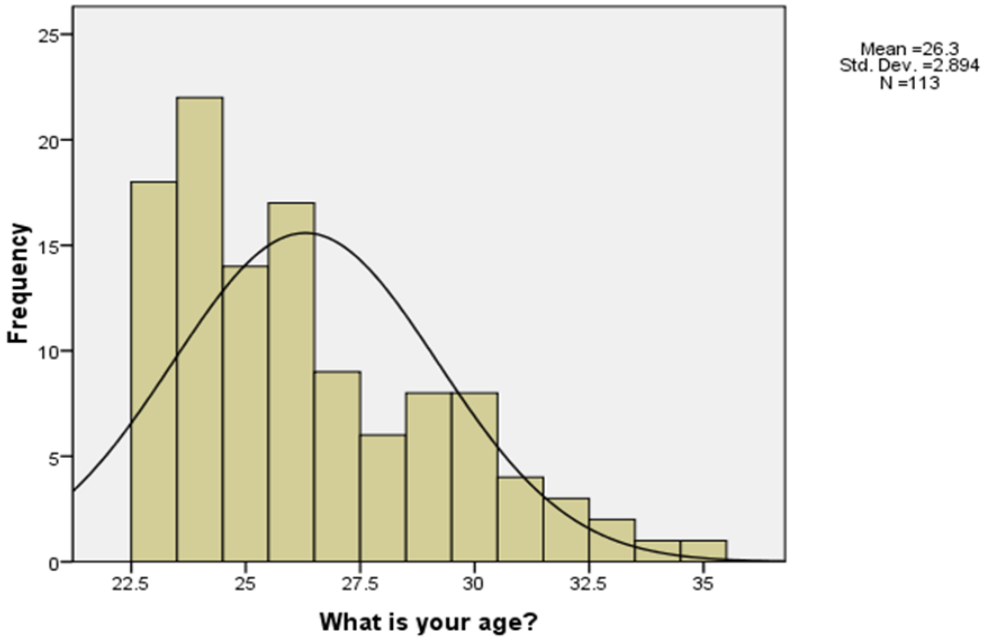

Table I: Postural Grading for Different Regions of Body (n= 113)

REGIONS OF BODY	GRADES		
	Poor	Fair	Good
Head	24 (21.2%)	28 (24.8%)	61 (54.0%)
Neck	21 (18.6%)	46 (40.7%)	46 (40.7%)
Shoulders	22 (19.5%)	44 (38.9%)	47 (41.6%)
Upper back	23 (20.4%)	30 (26.5%)	60 (53.1%)
Abdomen	17 (25.0%)	23 (20.4%)	73 (64.6%)
Spine	22 (19.5%)	44 (38.9%)	47 (41.6%)
Lower back	28 (24.8%)	37 (32.7%)	48 (42.5%)
Hips	24 (21.2%)	26 (23.0%)	63 (55.8%)
Ankles	21 (18.6%)	38 (33.6%)	54 (47.8%)

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About 24.77% of pregnant females scored 0 (poor) for lower back postural grading while 20.4% of pregnant females scored 0 (poor) for upper back postural grading. It is universally acknowledged that pain frequently occurs during pregnancy, but the pathophysiological mechanism of this pain produced during pregnancy is not articulated.

A large number of authors have already discussed the causes of pain arising during pregnancy.[21] [20] Saxton and Rhodes also proposed that almost all the backaches of childbearing are postural in origin.[13] But the current study showed that the changes and magnitudes of postural changes are not associated with back pain. Well, this part needs more work to be done.[22,21] The findings of this study suggest that postural adjustment which is observed in pregnant women is increased lumbar lordosis, which probably occurs prominently by the 8th month of pregnancy to inhibit the loss of balance.

This study also tells us that forward pelvic rotation develops during pregnancy resulting in poor posture at the hip and pelvis. The promptness of this physiologic postural change causes remarkably severe stress on muscular attachments and ligaments resulting in musculoskeletal pain and prominent postural changes.[9] The suggestions and associations made by this study coincide with the study conducted by Fernando Martinez and his co-workers who worked on the changes produced by planter pressure and their relationships with low back pain during pregnancy.[23] This current study validated and showed significant increases in the curvature of the thoracic and lumbar spine during pregnancy. It should be noted here that although the mean changes in curvatures were relatively small, some pregnant females showed a marked increase in lumbar curvature during the 16th week of the gestation period, resulting in lumbar kyphosis and poor posture. These results and findings coincided with the conclusions made by Natsuko Okanishi and co-workers who worked to find out the spinal curvatures and the characteristics of postural changes in a pregnant woman. They also concluded that spinal curvature revealed a tendency for lumbar kyphosis in pregnant women.

Pregnancy might cause changes in spinal posture and spinal curvature, which might lead to relevant symptoms.[24] There have been different points of view referring to how a pregnant female adjusts herself to carry the weight of the fetus.[25] The significant increase in the lumbar curvature observed in this study confirms their subjective points. Although a small number of pregnant women in this study showed postural change. Spankus and Sands well thought out that forward displacement of the sacrum and pelvic inclination takes place during pregnancy.[3]

This current study revealed a change in pelvic inclination in the posterior direction and a forward tilt, but this change did not reach a significant level. Results of this current study therefore it does not confirm views revealed in the preceding studies regarding pelvic inclination. But this study tells us that the changes in the thoracic curvature were of equal significance and magnitude to those in the lumbar region. This finding that the kyphotic curve increases as significantly as the lordotic curve during pregnancy recommends that physiotherapists might pay direct attention to this region during their treatment and rehabilitation program.

This current study also highlights and emphasizes the importance of looking at the pregnant woman's overall posture during assessment rather than focusing only on one region.[26,27] The examination of initial posture and changes in magnitude and nature of these changes during pregnancy emphasizes the

importance of the physiotherapist to assess each pregnant women's posture early in the natal, pre-natal and post-natal program. This study also recommends that it is not only important to govern initial postural alignment but also assess it progressively, so that suitable therapeutic and preventive measures might be taken.

Although no postural change was found to be an imperative interpreter of pain, it is however important for the physiotherapist to certify that the pregnant woman does not develop poor postural habits during her gestation period which could be sustained in her after-pregnancy life.[8,28] This current study has validated that on a certain day, a pregnant female assumes a steady and consistent posture, (specifically talking about spinal curvature and pelvic inclination) when she is asked to stand comfortably erect.

This information applies to both, those suffering from low back pain as well as those who are symptom-free and to those whose body physique has changed from normal body proportions, as in the case of pregnant females. This information is important for patient management. Seemingly, a pregnant female's awareness of what constitutes for them is a comfortable erect posture is satisfactorily consistent that they can assume a similar posture repetitively.[29] This study also recommends carrying out randomized controlled trials to find out the effectiveness of various exercise therapies on back pain and lordosis in various trimesters of pregnancy in Pakistan.

As Youseabadi[30] and his co-workers highly recommended that exercise therapy prevents and also treats this common and costly problem in the 2nd trimester of pregnancy. In Pakistan, pregnant females are in the dire need of less costly preventive and treatment measures for this problem. So accordingly, based on all the preceding substantiation and results of this current we concluded that the occurrence of postural changes during pregnancy is common.

CONCLUSION

Pregnant women are most prone to develop postural changes during pregnancy due to an increase in ligamentous laxity and weight of the fetus during pregnancy. About 28 (24.8%) pregnant women were reported to have poor lower back posture. This study showed the prevalence of postural changes during pregnancy which was 24.77% of those who had poor posture.

DECLARATIONS

Consent to participate: Written consent had been taken from patients. All methods were performed following the relevant guidelines and regulations.
Availability of data and materials: Data will be available on request. The corresponding author will submit all dataset files.
Competing interests: None
Funding: No funding source is involved.
Authors' contributions: All authors read and approved the final manuscript.

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