SPINAL CURVE CHANGES AND SEVERITY OF PAIN IN PREGNANCY & NON-PREGNANT.

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ABSTRACT

PURPOSE- To study about spinal curve changes and severity of pain in pregnancy & non-pregnant women.

METHOD- Prior of beginning data collection, consent form was filled by each participant. At the start of the study each patient was assessed by Visual Analog Scale (VAS) & Numerical rating scale (NRS) to assess the degree of pain. After the assessment was taken, participants were divided into two groups that is pregnant women group as group 1 and non-pregnant women group as group 2.

RESULT- The comparison of group 1 and group 2 by using VAS was calculated separately, the mean value and the standard mean value of group 1 was 68.8 and 15.9423 respectively and for group 2. It was estimated to be 26.6 and 10.0320 respectively.

The comparison of group 1 and group 2 by using NRS was calculated separately, the mean value and the standard mean value of group 1 was 7.5 and 1.5 respectively and for group 2. It was estimated to be 1.6 and 0.916 respectively.

CONCLUSION- Pregnancy brings a lot of physical changes and increased pain, all the changes are associated as a result of pregnancy but by studying its degree of pain and gradual changes and it’s impact on the women’s body can help to identify the risk factor and can address about the precautions and modifications that can be done to reduce the negative impact on the body of the women during pregnancy, also it will help to develop a healthy system for pregnant women.

INTRODUCTION

Pregnancy brings about a lot of emotional and physical changes in a women’s body, it is easy to deal with emotional consequences but physical changes come with increased stress on the joints and musculoskeletal system of the body. The variety of changes includes changes in the spinal curvature mainly it results in increased lordotic and kyphotic curvature, increased level of pain such as low
According to studies it was found that the center of gravity of pregnant women moves towards the abdomen, which results into increased lumbar lordosis and posterior tilt of the sacrum increases as the fetus grows. Low back pain is the common symptom in pregnancy, according to the studies it was found that during pregnancy (50.9%), and 49% of pregnant women complain of pelvic region pain lasting more than three months, 10% of pregnant women complain of pelvic region pain throughout pregnancy. During pregnancy weeks 1-12 is stated as first trimester, weeks 13-28 is considered as second trimester and weeks 29-40 is called third trimester. The low back pain normally increases in the during the course of pregnancy with gradually increasing severity of pain till the final and third trimester, it is found that the cause of this pain in the third trimester is reduced quality of life, disability and postpartum depression. Due to the forward-shift in the center of gravity of pregnant women there is an effect on balance, increased amount and speed of postural sway. Also approximately 27% of pregnant women have a risk of falling down. Whenever a fall occurs, it might cause an emergency situation in a study it was found that 40% of pregnant women are subjected to such situations, such as head injury, fracture, or miscarriage. Another factor is Education of pregnant women which concern about the pain relief and correct therapeutic methods of movement is needed because various physical and functional changes due to pregnancy might cause mental problems in pregnant women. Therefore, there is a need to understand the physical and functional changes occurring due to pregnancy. Studying these aspects of pregnancy help in Identifying the cause of increased spinal curvature can help to decrease the discomfort caused to the concerned population. Changes in the Lordotic curvature, increased severity of pain and abnormal gait pattern cannot be prevented completely because it is a cause of
pregnancy but proper exercises and correct posture can help to reduce its negative impact on the women’s body. Changes in posture and mild adjustments are vital to maintain balance and stability of the pregnant women\(^4\), due to occurrence of anatomical changes during pregnancy can be fundamental complaint such as low back pain. However, it is not clear whether all pregnant women develop sway-back posture, postural changes, and whether there is any postures which are associated with absence of complaints\(^8\). Complains related to spinal curvature and posture of pregnant women can be related in one or two aspects. Few studies have showed the assessment of posture and spinal curvature. One of the reasons for the lack of consistency between studies of postural change in pregnant women can be difficulty in measuring and evaluating posture. Radiographic assessment of spinal curvature is common, but risks exposing pregnant women to radiation\(^3\) hence, this study was done to examine the differences in the spinal curvature, increased pain severity and between pregnant and non-pregnant women with the aim of proving basic data for health care in pregnant women. This study is taken up to determine the spinal postural changes and severity of pain between normal and nonpregnant women.

**Methodology**

**Tools used in the study**

1) **Visual analog scale (VAS)**

A Visual Analogue Scale (VAS) is a measurement tool that tries to measure a cause or attitude that identified to range across a time of values and cannot be easily measured. VAS is often used for
clinical research to measure the intensity or frequency of pain through visual analysis of the patient. It consists of a straight line with the endpoints that defines two extreme limits i.e. ‘no pain at all’ and ‘pain as bad as it could be’, Then the patient is asked to mark his level of pain on the line present between the two endpoints as stated above. The distance that is measured between ‘no pain at all’ and the mark defines the patient’s pain. \(^{17-19}\)

2) Numerical scale rating (NRS)

A Numerical Rating Scale (NRS), can be defined as a scale that provide a quantitative symbolization of a variable such as pain, it helps to identify the degree of pain given by, the patient, by the help of numerical rating. This type of scale is used by presenting the patient with an ordered set of numbers from which they have to choose the amount of pain they are experiencing, for example, 1 to 10. \(^{20,21}\)

A sample of 22 participants from multicenter were selected conveniently, 10 pregnant women and 10 non-pregnant women. For sample selection personal communications were done with the desired community. 2 participants discontinued due to personal reason. All 20 participants completed the entire study till the end. screening was done to fulfill the inclusion criteria. Informed consent was taken from all the participants at the start of study.

Inclusion Criteria
Pregnant women of 2\textsuperscript{nd} trimester, normal women.

**Exclusion criteria**

If they had problems maintaining a standing posture or walking, surgery of the lumbar spine, pelvis, hip, or knee; fractures, tumors, or active inflammation in the lumbar spine or pelvis, active polyarthritis, rheumatoid arthritis, or severe osteoporosis or pulmonary, cardiac, visual, auditory, or cognitive disorders.

**Procedure**

Prior of beginning data collection, consent form was filled by each participant. At the start of the study each patient was assessed by Visual Analog Scale (VAS) & Numerical rating scale (NRS) to assess the degree of pain. After the assessment was taken, participants were divided into two groups that is pregnant women group as group 1 and non-pregnant women group as group 2. Participants were given awareness about the risk factors concerning pregnancy and how their physical health and posture can affect their level of pain during pregnancy. Each participant in group 1 was assessed for VAS and NRS to measure their degree of pain for 6 weeks during their 2\textsuperscript{nd} trimester and frequent X-ray reports were taken and studied to identify their increase in spinal curvature with course of time. On the second hand, group 2 i.e. non-pregnant women were also tested for VAS and NRS to compare their level of pain with group 1 and frequent X-ray reports were also monitored same as group 1 for
better and clear comparison. All data was recorded and entered on a Microsoft Excel sheet. Further data analysis was done. The data analysis was done by taking 20 participants; these participants were selected according to the inclusion criteria; comparison was done between 10 pregnant women and 10 normal women about the low back pain and deviation in the spinal curvature of Pregnant women group and non-pregnant women group. Individual mean and standard mean deviation were used to compare the data analysis done between group 1 and group 2. To identify the difference in the spinal curvature between group 1 and group 2, x-ray findings were recorded. Data analysis was done by using SPSF statistical software.

RESULT

Following tables project the data obtained from the study and its significance

TABLE 1

<table>
<thead>
<tr>
<th>Variables</th>
<th>Group 1 (n=10)</th>
<th>Group 2 (n=10)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean</td>
<td>SD</td>
</tr>
<tr>
<td></td>
<td>Mean</td>
<td>SD</td>
</tr>
</tbody>
</table>
Table 1.1 Comparison between group 1 (pregnant women) and group 2 (non pregnant women) by using Visual analog scale (VAS)

As we can see from the table 1.1 the comparison of group 1 and group 2 by using VAS was calculated separately, the mean value and the standard mean value of group 1 was 68.8 and 15.9423 respectively and for group 2. It was estimated to be 26.6 and 10.0320 respectively. It concluded that the mean value and standard mean value of group 1 is higher than group 2.

| VAS     | 68.8  | 15.9423 | 26.6  | 10.0320 |

**TABLE 2**

<table>
<thead>
<tr>
<th>Variables</th>
<th>Group 1 (n=10)</th>
<th>Group 2 (n=10)</th>
</tr>
</thead>
<tbody>
<tr>
<td>NRS</td>
<td>Mean</td>
<td>SD</td>
</tr>
<tr>
<td>7.5</td>
<td>1.5</td>
<td>1.6</td>
</tr>
</tbody>
</table>
Table 1.2 Comparison between group 1 (pregnant women) and group 2 (non pregnant women) by using Numerical rating scale (NRS)

As we can see from the table 1.2 the comparison of group 1 and group 2 by using NRS was calculated separately, the mean value and the standard mean value of group 1 was 7.5 and 1.5 respectively and for group 2. It was estimated to be 1.6 and 0.916 respectively. It concluded that the mean value and standard mean value of group 1 is higher than group 2. Hence, it stated that the degree of pain in group 1 (pregnant women) by testing both the variables ie. VAS and NRS is higher than group 2 (normal women).
Graph 1.1 Comparison between group 1 and group 2 score in the variable VAS

![Graph showing comparison between group 1 and group 2 score in the variable VAS. The mean score for group 1 is 7.5, while the mean score for group 2 is 1.6.]
DISCUSSION

The motive of this study was to compare the spinal curvature and degree of pain between pregnant and normal women that is group 1 and group 2. The results showed that the standard mean deviation was higher in group 1 (pregnant women) in comparison with group 2 (normal women) it evidently stated that in the 2nd trimester during pregnancy women experiences increased level of pain and discovers several changes in their spinal curvature that can further lean t increased low back pain and also increases the risk of falling and physical breakdown.22 Changes in the spinal
Curvature was estimated by the help of X-rays per week and there was a clear difference shown in the reports, group 1 showed more lumbar lordosis that keep on increasing with course of time during pregnancy. It further results in abnormal posture and gait pattern. The basic aim of this study was to identify preventive measures and pain management techniques to build a better healthy society with respect to pregnant women all over the globe. According to a study, they used VAS as an outcome measure to identify degree of pain of the pregnant women in the pelvic region, low back, shoulder, calf, and foot according to pregnancy period, as a result, the pain was found to increase significantly in all regions from the second trimester to the third trimester of pregnancy. In another study Berg et al. identified that within 26 and 35 weeks the highest level of pain in low back and pelvic region they found significant increase in low back pain by the third trimester in their study. Hynu Yoo et al. in their study reported the curvature of the thoracic and lumbar spine in pregnant women. As a result, they identified that the angles of the thoracic and lumbar spine curvature were increased by 0.83° and 1.02°, respectively, however in the third trimester of pregnancy compared with the second trimester, the angle of the lumbar spine curvature was increased significantly (2.71°) in the third trimester in the pregnant women compared with non-pregnant women. This study monitored about the changes in spinal curvature and degree of pain in pregnant and non-pregnant women to help and identify the risk factors and help them to reduce them in order to build a better health care system for pregnant women in India. Pregnancy turns be the most opportune yet painful condition. There are a lot of changes occurring at the time of pregnancy in a woman, not only emotional but a variety of physical changes also come across the whole period. According to the senses it was found that Pregnancy-related low back pain (PR-LBP) is a common
symptom during pregnancy (50.9%), and 49% of pregnant women complain of pelvic region pain lasting more than three months, 10% of pregnant women complain of pelvic region pain throughout pregnancy. In the year after birth, 72% of the women experience lumbopelvic region pain. In a study it was also identified the psycho social factors associated with pregnancy-related lumbopelvic pain intensity (educational level) and interference and also a variable (age) that moderated the association between pain intensity and pain interference. The findings support a bio psycho social approach in understanding the experience and impact of pregnancy-related lumbopelvic pain. Pregnancy-related lumbopelvic pain is prevalent and has been shown to interfere with women’s quality of life in several women around the globe. It was also found that that lumbar spine lordosis increased in pregnant women compared with non-pregnant women. In another study, the spinal curvature of pregnant women was measured with Formatri-cII. As a result, the angle of the thoracic spine curvature increased by 12% between 12 and 22 weeks and increased by a total of 24% between 12 and 32 weeks. The lumbar spine curvature increased by 18% between 12 and 22 weeks and by a total of 41% between 12 and 32 weeks. Therefore, the spinal curvature of pregnant women increases toward the end of pregnancy. Changes occurring in lordotic curve due to pregnancy a study was done in 2015, this study measured the curvature of the thoracic and lumbar spine using Back Mapper in pregnant women. As a result, the angles of the thoracic and lumbar spine curvature increased by 0.83° and 1.02°, respectively, in the third trimester of pregnancy compared with the second trimester. The angle of the lumbar spine curvature increased significantly (2.71°) in the third trimester in the pregnant women indicates the changes in the spinal curvature due to pregnancy occurred intensively in the third trimester, and the low back pain of pregnant women in the first and
second trimesters might not be the result of these changes in spinal curvature. In other studies, it was compared the posture of women in the first and second trimesters and reported that the angle of the lumbar spine curvature increased by 5.9°, the anterior tilt of the pelvis increased by 4°, and the position of the head moved to the posterior. By comparing with previous studies, it could be seen that even though the changes in degree were not much, there was tendency to increase. A pregnant woman's body experiences drastic changes during the course time of pregnancy that a normal woman does not. You can easily differentiate the changes occurring in a pregnant woman in comparison of a normal woman. In an article it was identified that in a comparison of the WDI between the pregnant women and non-pregnant women, there were no significant differences in the second and third trimesters of pregnancy regardless of whether the eyes were open or closed while standing on a stable surface, but the WDI increased significantly in the pregnant women in second and third trimesters of pregnancy on an unstable surface compared with that in the non-pregnant women.

**Future scope:** identifying changes in spinal curve and degree of pain can be improved and more accurate by increasing the duration of the study and by inducing modern techniques to measure the spinal curvature can help and bring better results of the study.

**Limitation of the study:** the duration of the study was limited for more accurate results the duration of the study can be increased also the study did not focus about the dynamic changes in the pelvis and the limbs.
CONCLUSION

Pregnancy brings a lot of physical changes and increased pain, all the changes are associated as a result of pregnancy but by studying its degree of pain and gradual changes and it’s impact on the women’s body can help to identify the risk factor and can address about the precautions and modifications that can be done to reduce the negative impact on the body of the women during pregnancy, also it will help to develop a healthy system for pregnant women.
REFERENCES


2. Yawen Yu 1, Hyun Chae Chung LH. Standing body sway in women with and without morning sickness in pregnancy. pubmed. 2013;


15. Amal M. Yousef HMH. Postural Changes during Normal Pregnancy. Semant Sch [Internet]. 2011; Available from: https://www.semanticscholar.org/paper/Postural-Changes-during-Normal-Pregnancy-Yousef-Hanfy/2f7cbe7f224f7c695f522fa15aa745b1dd5cf95e

17. AMK. Does the clinically significant difference in visual analog scale pain scores vary with gender, age, or cause of pain? Acad Emerg Med. 1998;


23. Britt Stuge 1, Gunvor Hilde NV. Physical therapy for pregnancy-related low back and pelvic pain: a systematic review Britt Stuge 1, Gunvor Hilde, Nina Vøllestad. pubmed. 2003;


