"To Evaluate the Postural Changes in Cervical and Thoracic Spine Pre & Postpartum Women With and Without Neck Pain"

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Abstract
Aims and objectives:
Neck pain and postural changes in the cervical and thoracic spine are the frequent complaints which develop during pregnancy and postpartum. These may be due to the postural changes/adaptations seen usually in the prepartum and postpartum phase of pregnancy. The aim of the study to assess the cervical and thoracic postural angles of prepartum women with neck pain. To compare the cervical and thoracic postural angles in pre-partum women without neck pain. To compare the cervical and thoracic postural angles in post-partum women without neck pain. To asses and document the cervical and thoracic postural angles in nulliparous, primagravida and multi gravida women.

Methodology: *Subjects were nulliparous women (n=40), Prepartum women with and without neck pain(n-40) Postpartum women with and without neck pain(n=40). The subjects were invited to fill in the questionnaire after approval was taken. The sample was analysed by calculation the prevalence of neck pain. Chi square test was used to analyse the association between neck pain and associated risk factors. Postural changes in the cervical and thoracic spine was taken and analysed in Image J software to see the difference the groups. One way ANOVA was used to analyse the difference in between the groups.*

Results: *The prevalence of neck pain is 53.8% (43/80) in prepartum and postpartum women. There is a significance (p=0.02) difference in between neck pain occurrence and parity and parity and number of live children. Breast feeding and in supported sitting position 52.2 %(CI=95%) reported of neck pain. Neck pain did not refrain women from doing their household works or job (p=0.395, 0.639, 0.313). Cervical and thoracic angles measured and compared in between all the groups has a significanceof-0.005 (cervical angle) and p=0.36 (thoracic angle) respectively.*

Interpretation & conclusion: *The prevalence of neck pain and postural changes seem to be significant in Warangal population of prepartum and postpartum women. Age, employment were not considered as prediction factors. Weight, education, number of live births and parity are playing a significant role in developing neck pain. Further research should focus on the postural changes and neck pain occurring in the same women from nulliparous to postpartum period. Progressive longitudinal study is required.*

Key words: *Neck pain, nulliparous women, prepartum women, postpartum women, postural changes in cervical and thoracic spine.*

I. Introduction:

While pregnancy is a common event for reproductive-age women, surprisingly little has been published about the physical and emotional changes that typically occur during pregnancy and the postpartum period. Better understanding of the changes in health status that occur over the course of pregnancy could help women to define their expectations and to manage them.

In human anatomy the vertebral column consists of the cervical, thoracic, lumbar, sacral and coccygeal vertebrae, the primary two curves (thoracic and sacral) retain their original posterior convexity whereas the secondary two curves (cervical and lumbar)show reversal of this original posterior curve. The thoracic and sacral curves are known as kyphotic curves whereas the cervical and lumbar curves are known as lordotic curves."

Physical changes in Pregnant Women:

Pregnancy is a unique and demanding period in a woman's life. The physical stress of parenting and caring is a female dominant task, daily repetitive stress from tasks that require feeding and lifting the child can compromise the spinal integrity. As the pregnant women proceeds from the first trimester to the third trimester, postural adaptations can be noted.

Neck pain is the most common problem in primary health care and it contributes significantly to individual suffering. Neck pain and its related disability cause an important socioeconomic burden to society. It is the second largest causes of time off work, after low back pain. Neck pain may arise from the muscle, joints, tendons, soft tissue, bones, neural tissue, periosteum, ligaments. The exact origin is typically difficult to identify. There is no consistent clinical classification system for neck pain or cervical pain in literature.

Hence considering all the above views firstly this study intended to find out neck pain characteristics in pregnant women and secondly to examine that pregnancy related postural changes in cervical and thoracic spine.

II. Aims And Objectives

1. To assess the cervical and thoracic postural angles of prepartum women with neck pain
2. To assess the cervical and thoracic postural angles of postpartum women with neck pain.
3. To compare the cervical and thoracic postural angles in pre-partum women without neck pain.
4. To compare the cervical and thoracic postural angles in postpartum women without neck pain.
5. To asses and document the cervical and thoracic postural angles in nulliparous, prima gravid and multi gravid women.

III. Methodology

STUDY DESIGN:
Case-control Study Design

SOURCE OF DATA: As part of the study the pre partum, postpartum and nulliparous women were taken references from various Gynaecologists, Hospitals, other private clinics, subjects were assessed for study at Vaagdevi College of Physiotherapy and Rehabilitation Clinic attached to Vaagdevi college of Physiotherapy.

The subjects were divided into the following groups:

1. Prepartum women with neck pain
2. Postpartum women with neck pain
3. Prepartum women without neck pain
4. Postpartum women without neck pain
5. Nulliparous women

SAMPLING PROCEDURE:

The study was carried out with purposive sampling method. All women who met the selection criteria were invited to participate in the study. A sample of 160 samples of prepartum, postpartum and nulliparous women who came to the Vaagdevi Physiotherapy and Rehabilitation Clinic were recruited for the study. A group of 40 nulliparous women without any complaint of neck pain were taken as control group. A group of 40 prepartum women and 40 postpartum moments with and without neck pain were taken as the experimental group for the study. A written consent (approved by ethical committee of the Vaagdevi College of Physiotherapy) was obtained stating voluntary acceptance by the subject to participate in our study.

Inclusion criteria:
- Nulliparous women,No history of cervical trauma, No pregnancy till date
- Pregnant women in the 3r trimester of pregnancy (7h, 8th, 9th month)
- Postpartum women those within less than one year after delivery

Exclusion Criteria:
- Congenital deformities, Recent surgeries, History of injury to the spine
- Cervical radiculopathies, Decreased range of motion in the neck

Data Collection Tools:
- Neck pain questionnaire
- Nikon Coolpix S8100 Digital Camera (resolution - 12 megapixel)
- IMAGEJ software (Image Processing and Analysis in Java)
- Pen
- Chair
- Anatomical markers (fluorescent skin markers with tape on one side)
- Plumb lime

Procedure:
Experimental phase:

Once the Neck Pain questionnaire was filledin, the subject was taken inside a lab. Here a plumb line which was priorly setup with a help of a stand. The subjects were instructed to remove their footwear and

positioned in front of the plumb line. The starting position was standardized by placing the subjects in an upright posture, which was defined as a vertical pelvic position with an assumption of lumbar lordosis and thoracic kyphosis and the subjects were asked to maintain that position while gazing at a picture in front of them.

Postural analysis:
Cervical angle: It is the angle between a horizontal line through the spinous process of C7and a line from spinous process of C7 through the tragus of the ear.
Thoracic angle: It is the angle between a horizontal line through the spinous process ofT7 anda line from spinous process of T7 through the tragus of the ear.

Cervical and thoracic posture was measured from a lateral view photograph taken with a Nikon Coolpix S8100 digital camera (resolution-12 mega pixel) positioned on a tripod at a distance of 0.8m. The axis of the lens of the camera was placed orthogonal to the sagittal plane of the patient at a height that corresponded with the seventh cervical vertebrae. Anatomical markers were positioned on the tragus of the ear, the spinous process of the seventh cervical and seventh thoracic vertebrae.

Image J Software 1.14:

This is free downloaded software from rsb.info.nih.gov/ij which runs in Linux, Mac OSX and Windows in both 32-bit and 64-bit modes. Image J and its Java source code are freely available to public domain and no license in required. It measures angles, area, length, mean, standard deviation, min and max of selection or entire image and uses real world measurement units such as millimetres. This creates rectangular, elliptical or irregular rare selections. Creates line, point selections. Edits, selects and automatically creates them using the wand tool. Draws fill, clear, filter or measure selections. Saves selections are transfer them to other images.

The photograph of subjects was made into a file and this file was directly copied into the Image J software for analysis. The angle of forward neck posture was measured from a line drawn from the tragus of the ear to the seventh cervical vertebrae; the software produced a horizontal line perpendicular to the vertical plum line captured in the back.

Thoracic posture was calculated as the angle between the horizontal line from the seventh thoracic spinous process and the line drawn from the tragus of the ear. The angle was given by the software along with X and Y axis. This was taken and the correlation in between all the groups was done for the cervical and thoracic vertebrae.

IV. Results

Table 5.1: Demographic characteristics of total 120 nulliparous women, Prepartum women with neck pain, Prepartum women without neck pain, postpartum women with neck pain, post partum women without neck pain.

	Age(years)			Height (cm)			Education		
GROUP	M	SD	SEM	M	SD	SEM	M	SD	SEM
NULLIPAROUS	22.4	1.75	0.2	137.3	7.49	1.1	4.0	.00	.00
PREPARTUM WITH N-PAIN	24.90	2.57	0.5	138.03	6.65	1.4	3.3	0.8	0.1
PREPARTUM WO N-PAIN	24.38	2.56	0.4	137.6	6.27	1.4	3.3	0.7	0.1
POSTPARTUM WITH N-PAIN	25.7	2.66	0.5	138.07	6.99	1.4	3.4	0.7	0.1
POSTPARTUM WO N-PAIN	25.89	2.99	0.6	138.02	6.84	1.4	3.4	0.7	0.1

Weight present (kgs)			Weight before pregnancy(kgs)			Weight at delivery(kgs)			Marriage age (years)		
M	SD	SEM	M	SD	SEM	M	SD	SEM	M	SD	SEM
53.1	7.7	1.2	-	-	-	-	-	-	-	-	-
57.4	3.3	0.7	53.7	53.7	0.7	-	-	-	20.9	1.7	0.4
54.8	4.5	1.0	51.1	4.0	1.0				20.8	1.8	0.4
57.0	4.1	0.8	52.5	11.0	0.7	59.4	3.8	0.7	21.0	1.9	0.3
57.4	6.3	1.4	54.5	5.2	1.2	58.5	6.0	1.3	21.5	1.7	0.3

Table 5.I shows the demographic details of all the 120 women who participated in the study. It includes:
1.   Nulliparous women with a mean age of 22.4(SD-1.75 and SEM-0.2) and mean height and weight of the women 137.3cm (SD-7.49. SEM-1.1) and 53.1 kgs (SD-7.7, SEM-1.2)
2.   Pre-partum with neck pain with a mean age of 24.90(SD-2.57. SEM-0.5) mean height of the women 138.03cm (SD-63. SEM1.4) and mean of weight at present and before delivery57.4kgs (SD-3.3, SEM-0.7) and 53.7kgs (SD-3.2, SEM-0.7).20

3.	Prepartum without neck pain with a mean age of 24.38(SD-2.56, SEM-0.4) mean height of the women 137.6cm (SD-6.27. SEM-S4) mean of weight at present and before delivery54.8kgs (SD-4.5, SEM-1.0) and 51.1 kgs (SD-4.3, SEM 1.0).

4.	Post-partum with neck pain with a mean age of 25.7(SD-2.86, SEM-0.5) mean height of the women138.0cm (SD-6.99, SEM-1.4) and mean weight at present, before delivery and after delivery 57.0kgs (SD-4.1, SEM-0.8), 52.5kgs (SD-11.0, SEM-0.7) and 59.4kgs (SD3.8. SEM-0.7).

5.	Post-partum without neck pain with a mean age of 25.89(SD-2.99, SEM-0.6) mean height of the women 138.02cm (SD-6.84. SEM-1.4) and mean of weight at present, before delivery and after delivery 57.4kgs(SD-6.3, SEM-1.4), 54.5kgs(SD-5.2, SEM-1.2) and58.5kgs(SD-6.0.SEM-1.3) respectively.

Table 5.2: Chi-square test analysis to find out association between prevalence of Neck Pain in different groups of women.

		Groups								Total	
		Prepartum with neck pain		Prepartum without neckpain		Postpartum with neck pain		Postpartum without neck pain			
		number	%	number	%	number	%	number	%	number	%
neck pain	No	0	.0%	18	100%	0	.0%	19	100%	37	46.3%
	Yes	20	100%	0	.0%	23	100%	0	.0%	43	53.8%

Table 5.2 shows the first question in the questionnaire which was used as a deciding factor to find out the number of prepartum and postpartum women suffering from neck pain compare to those who are not. The prevalence of neck pain in prepartum and postpartum women is 53.8%(43/80) and the prevalence of prepartum and postpartum women without neck pain is 46.3% (37/80).

Table 5.3: Prevalence of Neck pain course in different groups of women using Chi-square test analysis.

		Groups					
		Prepartum with neck pain		Postpartum with neck pain		Total	
		number	%	number	%	number	%
Neck pain course	1.00	3	15.0	4	17.4	7	16.3
	2.00	2	10.0	2	8.7	4	9.3
	3.00	1	5.0	1	4.3	2	4.7
	4.00	8	40.0	6	26.1	14	32.6
	5.00	1	5.0	3	13.0	4	9.3
	6.00	1	5.0	1	4.3	2	4.7
	7.00	1	5.0	2	8.7	3	7.0
	8.00	1	5.0	4	17.4	5	11.6
	9.00	2	10.0	0	0.0	2	4.7

Table 5.3 shows the prevalence of the neck pain course which is present in different groups of prepartum and postpartum women. There is significance in the prepartum and postpartum group women who 40.0% and 26.1% in both the groups who complained of neck pain due to posture.

Table 5.4 Correlation of the cervical and thoracic angle in between all the groups of women.

	CERVICAL ANGLE (DEGREES)				THORACIC ANGLE (DEGREES)				CORRELATION		
	MEAN	SD	95% CI FOR MEAN		MEAN	SD	95% CI FOR MEAN		R	P	N
			lower bound	upper bound			lower bound	upper bound			
Nulliparous	53.3	5.81	51.53	55.25	54.8	4.33	53.4	56.1	0.571	0.000	40
Prepartum with neck pain	47.0	5.86	44.3	49.7	52.2	3.59	50.5	53.9	0.604	0.005	20
Prepartum without neck pain	50.4	4.12	48.3	52.4	53.2	3.60	51.4	55.0	0.560	0.016	18
Postpartum with neck pain	51.	5.67	48.7	53.6	55.6	3.45	54.1	57.1	0.609	0.002	23
Postpartum without neck pain	50.8	7.71	47.1	54.5	55.1	4.42	52.9	57.2	0.868	0.000	19

Table 5.4 shows the significant correlation of cervical and thoracic angles in between nulliparous women, prepartum with neck pain and without neck pain, postpartum with neck pain and without neck pain, p=0.000, 0.005, 0.016, 0.002, 0.000 and r = 0.571, 0.604, 0.560, 0.609, 0.868 respectively.

Table 5.5: The difference of cervical and thoracic angles in between all the groups of women using One way ANOVA.

		F	SIGNIFICANCE LEVEL
CERVICAL ANGLE	BETWEEN GROUPS	3.90	0.005
THORACIC ANGLE	BETWEEN GROUPS	2.67	0.036

Table 5.5 Tukey's post hoc analysis to find the pair wise comparisons between groups for cervical and thoracic angles.

V. Discussion

Pregnancy is the most unique and demanding period of a women's life. A pregnant women progresses from the first trimester to the third there are many changes in the biomechanical, physiological systems of the body which are mainly influenced by the changes in the mechanical, circulatory, hormonal and psychological factors. Three observers were involved in data collection and validated questionnaire were used along with Image J software for measuring the neck pain and postural changes in the cervical and thoracic spine .The results are as follows:

Base line characteristics:

The demographic details (variables) included in this study were age, height, weight during delivery, weight after delivery, weight at present, marriage age. The variables were compared to the groups i.e. nulliparous women, prepartum women with neck pain, prepartum women without neck pain, postpartum women with neck pain, postpartum women without neck pain were included. The mean of the age of women involved in the study differed in each group as a particular age limit was not taken into consideration The mean height is around 138,07 in between the groups.

Postural Angles:

There is significant difference in cervical angle between nulliparous and prepartum with neck pain (p=0.001). There is significant difference in thoracic angle in between prepartum women with neck pain and postpartum with neck pain (p=0.046).

VI. Conclusion

This study concludes that physiological changes and pregnancy alters neck and are consistent with our results showing significant difference between nulli parous women, prepartum women with and without neck pain and postpartum women with and without neck pain for cervical and thoracic angles. But these changes in the postural angles may not be consistent with the neck pain symptoms.

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