

Pattern of Prolactin Secretion after Normal Vaginal Delivery and in Cesarean Delivery

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ABSTRACT

Prolactin (PRL) is hormone of multiple biological actions and is best known for its role in milk production. This hospital-based study was undertaken to review the impact of PRL hormone in vaginal delivery and cesarean delivery. Our study is meant to create awareness in the society to promote breast feeding and the importance of promoting normal vaginal delivery whenever possible. In this study, we investigated the serum PRL values using enzyme-linked immunoflow assay method in 101 women who underwent normal (56) and cesarean delivery (45) in obstetrics and gynecology department of Kannur Medical College, Anjarakandy. Serum PRL at 24 and 48 hours blood sample was estimated among the two groups, mean PRL in vaginal delivery 24 hours 359.46 ± 119.70 ng/ml, 48 hours 386.67 ± 135.66 ng/ml and in cesarean delivery 24 hours 245.49 ± 115.49 ng/ml, 48 hours 282.92 ± 69.59 ng/ml. The values of serum PRL are found to be significantly higher in the vaginal delivery group ($p < 0.001$) as compared with the cesarean section group. Through this study, we concluded that the mothers who delivered by cesarean section had decreased PRL levels than the women who delivered vaginally which may have a significant role in establishment of breastfeeding.

Keywords: PRL, Glycoprotein, Lactogenesis, Hypoprolactinemia, Enzyme-linked immunoflow assay, Vaginal delivery, Cesarean section.

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INTRODUCTION

Prolactin (PRL) also known as luteotropic hormone (LTH) is a glycoprotein, peptide hormone secreted from the anterior lobe of pituitary with a molecular weight of 23,000

Daltons consisting of 199 amino acids with glycosylated and nonglycosylated forms.¹ It can be present in different forms: monomeric or 'little' PRL, dimerous or 'big PRL' and 'big-big PRL'.^{2,3}

It stimulates the mammary gland to produce milk (lactation). PRL promotes neurogenesis in maternal and fetal brains.⁴ PRL also stimulates proliferation of oligodendrocyte precursor cells.^{5,6} During pregnancy, high circulating concentrations of estrogen increase PRL levels by 10 to 20 fold, at the same time, estrogen, as well as progesterone, inhibit the stimulatory effects of PRL on milk production. It is the abrupt drop of estrogen and progesterone levels following delivery that allows PRL, which temporarily remains high to induce lactation.⁷

After childbirth, PRL levels fall as the internal stimulus for them is removed. Sucking by the baby on the nipple then promotes further PRL release, maintaining the ability to lactate after delivery. PRL controls milk production (lactogenesis) but not the milk-ejection reflex; the rise in PRL fills the breast with milk in preparation for the next feed.⁷

Reference Range^{8,9}

Serum PRL:

- Male: 3-25 ng/ml
- Female: 5-35 ng/ml
- Pregnancy: 90-400 ng/ml

The level of serum PRL above 35 ng/ml for women and above 25 ng/ml for men is considered under hyperprolactinemia.⁹

The level of serum PRL below 5 ng/ml for women and below 3 ng/ml for men is considered under hypoprolactinemia.

AIM

To study the pattern of PRL secretion after normal vaginal delivery and in cesarean delivery (elective and emergency cases).

OBJECTIVE

1. Estimation of serum PRL level in normal vaginal delivery and cesarean delivery cases.
2. To compare the PRL level in normal vaginal and cesarean delivery based on various parameters.

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Table 1: General characteristics of study subjects-vaginal delivery and cesarean

Subjects	Mean age	Mean PRL at 24 hours postdelivery	Mean PRL at 48 hours postdelivery
Vaginal delivery	24.76	359.46	386.67
Cesarean delivery	25.5	245.49	282.92

PRL: Prolactin

Table 2: Comparison of prolactin values in vaginal delivery cases at 24 hours postpartum

Mode of delivery	N	Mean rank	Sum of ranks
Normal	56	63.34	3547.00
Cesarean	45	35.64	1604.00
Total	101		

METHODOLOGY

Study Design

The study is designed to assess the pattern of PRL secretion after normal and cesarean delivery cases at Kannur Medical College, Anjarakandy over a period of 2 months approximately 101 samples. The demographic and clinical data from the obstetrics and gynecology department, KMC Anjarakandy will be used to study the relevance.

SAMPLE COLLECTION

Blood samples (venous blood of 2 ml) from normal and cesarean delivery cases were collected at 24 and 48 hours after delivery. A total of 200 µl serum samples were taken for analysis. The serum PRL is analyzed by Kit method using Enzyme-linked immunoflow assay (ELIFA) technique (Vidas Biomerieux) in Clinical Biochemistry Laboratory, KMC Anjarakandy.

ESTIMATION OF SERUM PROLACTIN

The assay principle combines an enzyme immunoassay sandwich method with a final fluorescent detection, ELIFA. The reagents for this assay are ready to use and predispensed in the sealed reagents strips. The strips are coated with alkaline phosphatase labeled antiprolactin (conjugate). The antigen (serum PRL) reacts with solid phase receptacle and to the conjugate forming a sandwich.

STATISTICS

Statistical evaluations were performed using Mann-Whitney U test to assay significant differences between means of two groups. A value of p < 0.001 was considered statistically significant. An independent T-test with Levene’s test for equality of variances was also performed.

RESULTS

The study comprised of 101 women of which 56 (55.44%) had vaginal deliveries and 45 (45.56%) had cesarean deliveries.

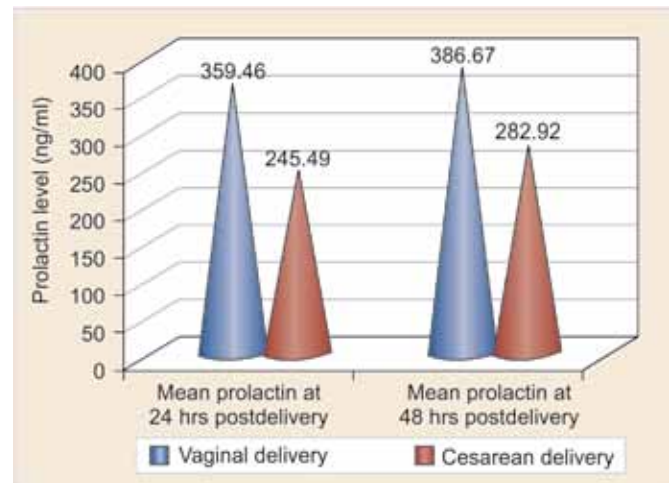
The Table 1 and Graph 1 show the comparison in the PRL values in the vaginal delivery cases at 24 hours postdelivery.

The Tables 2 and 3 show the comparison in the PRL values in the vaginal delivery cases at 24 hours post-delivery.

The values are found to be significantly higher in the vaginal delivery group than the cesarean group as analyzed by the Mann-Whitney U test, the significant being <0.001.

Analysis of the PRL values at 48 hours postdelivery in both groups is tabulated in Tables 4 and 5.

An independent t-test with Levene’s test for equality of variances, assuming variances are normal, it can be shown that the 48 hours values are higher in the vaginal delivery group.



Graph 1: Mean prolactin values at 24 and 48 hours postpartum and postcesarean cases

Table 3: Twenty-four hours prolactin values analyzed by Mann-Whitney U-test

	24 hour reading (ng/ml)
Mann-Whitney U	569.000
Wilcoxon W	1604.000
Z	- 4.721
Asymp. Sig. (2-Tailed)	.000 (<0.001)

Table 4: Mean prolactin values at 48 hours postpartum

Mode of delivery	N	Mean	Std. Deviation	Std. error mean
Normal	56	386.6721	135.66	18.129
Cesarean	45	282.9284	69.59	10.374

Std: Standard deviation

Table 5: Independent T-test with Levene's test for equality of variances in 48 hours

	Independent samples test								
	Levene's test for equality of variances		T-test for equality of means						
	F	Sig.	T	Df	Sig. (2-Tailed)	Mean diff.	Std. error diff	95% Confidence interval of the difference	
								Lower	Upper
Equal variances assumed	15.740	0.000	4.658	99	0.000	103.74370	22.273	59.548	147.939
Equal variances not assumed	—	—	4.967	85.465	0.000	103.74370	20.888	62.215	145.271

DF: Degrees of freedom; Sig.: Significant; Std.: Standard

Therefore, the values of PRL are significantly higher in the vaginal delivery group as compared with the cesarean section group.

DISCUSSION

We were able to conclude in our study that the values of PRL in women after vaginal delivery were significantly higher than the women who underwent cesarean section at 24 hours as well as 48 hours.

PRL levels postdeliveries are related to establishment of lactation. PRL comes back to normal in women who are not breastfeeding within a week. There are several factors that influence establishment of lactation. Apart from age of the mother, socioeconomic status, parity, and so on, the onset of lactation also plays a vital role in the establishment of lactation affecting the PRL levels.

It cannot be denied that in the case of a cesarean section with shortened or absent labor, the stimuli for the PRL peaks are lacking. The effects of anesthesia and drugs used for postoperative pain relief cannot be ruled out completely.¹⁰

It is obvious that the mothers who delivered by cesarean section had a delayed onset of lactation than the women who delivered vaginally. Also, there is a longer period of separation of the neonates from their mothers which may also play a role in the PRL peaking postdelivery.

The mood and self-esteem also seems to play a role in endocrine functioning as shown in the study conducted by Fisher, in Australia who demonstrated lower self-esteem and decline in mood women who underwent cesarean section.^{5,11} All these factors work in conjunction to produce a PRL level peak postdelivery to establish breastfeeding.

CONCLUSION

It can be concluded through our study that the PRL levels do not peak as expected in women undergoing cesarean section as compared with women who deliver normally. Longer periods of separation between the neonates and their mothers along with delayed onset of lactation and the probable effect of anesthesia and postoperative analgesics can be the probable causes for lower PRL levels postcesarean

delivery. The psychiatric influence of the birthing process (vaginal or cesarean) on the endocrine function is another aspect that may play a role.

We recommend multicenter large scale studies with additional parameters like oxytocin, oxidative stress, and psychiatric profile being taken into consideration.

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