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Comparison of maternal serum prolactin level in caesarean delivery and vaginal delivery in early post-partum period

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Introduction: Practice of starting and sustaining the breast feeding is affected by many conditions; mode of delivery is one of the major causes. Purpose of the study was to see if the mode of delivery affects the maternal serum prolactin level and subsequent breastfeeding in early postpartum period and to raise awareness among the community about the importance of mode of delivery in early initiation of breast feeding.

Material and Method: Present study was hospital based observational, comparative prospective study. 120 subjects in each group (caesarean delivery CD Group and vaginal delivery group) were required in sample size. Serum prolactin estimation at 1st hr and 24th hr done on both the groups.

Results: caesarean delivered women had higher educational and socioeconomic status. Caesarean delivery was done at an earlier gestation age as compared to normal delivery. Mean serum prolactin level at 1st hr and 24th hr of participants of CD Group was 259.68 ± 33.99 and 309.99 ± 42.27 respectively. The mean serum prolactin level at 1st hr and 24th hr of participants of VD Group was 304.91 ± 42.07 and 333.34 ± 42.65 respectively. There were higher S. prolactin levels in patients delivered via the vaginal route at 1st hr as well as at 24th hr.

Conclusion: Mode of delivery has a direct impact on maternal serum prolactin level. Caesarean delivery associates with lower s. prolactin level and a cause for delay in initiation of breastfeeding.

Keywords: serum prolactin, caesarean delivery, normal delivery, breastfeeding

Introduction

Prolactin, also known as luteotropic hormone is a glycoprotein peptide hormone, secreted from lactotrophes in the anterior lobe of pituitary, discovered by Henry Friesen. It is encoded by PRL gene on chromosome 6. It has molecular weight of about 23kda. It contains 199 amino acid residues and 3 disulfide bridges and has considerable structural similarity to human growth hormone.[1]

Prolactin has over 300 known biological activities; it plays a vital role in reproduction (lactation, luteal function, reproductive behavior) and homeostasis (immune responsivity, osmoregulation, and angiogenesis). Despite these many activities, the only recognized disorder associated with deficiency of prolactin secretion is the inability to lactate.[2]

Prolactin, the lactogenic hormone, is essential for glucocorticoid stimulation of the milk-protein genes.[3]

Breastfeeding stimulates the production of naturally occurring hormones oxytocin and prolactin. They promote stress reduction and positive psyche in nursing mothers. Prolactin is required for milk secretion and oxytocin for milk let-down.[4]Expression (manual/electric pump) of breast milk also stimulates prolactin. Receptors for prolactin are found on the basal membrane of the alveolus and its secretion depends on the intensity, duration and the frequency of nipple stimulation.[5]Thus suckling, emptying the breast, and receiving adequate precursor nutrients are essential to effective lactation.

During human pregnancy, when serum prolactin rises steadily to 150 to 200 ng/mL at term, there is a brief drop in levels, hours before delivery and then a rise again as soon as the neonate is start suckling.[6,7]

Suckling is a powerful stimulus to prolactin synthesis and secretion, and prolactin is necessary for milk secretion.[5]manyresearchers observed higher level of s. prolactin in vaginal delivery as compared to caesarean delivery [8,9]. Caesarean delivery is one of the important causes for delay in initiating breastfeeding. Following caesarean delivery, unassisted mothers are often unable to hold their newborns in the recovery room[10], are less likely to have skin-to-skin contact immediately after birth, and are more likely not to have attempted breastfeeding[11]. Previous studies show that mothers undergoing caesarean delivery and experiencing acute post caesarean pain have delayed onset of lactation as well.[12-14]

The purpose of the study to see if the mode of delivery affects the level of s. prolactin in early postpartum period and to raise awareness among the pregnant women and community about the importance of mode of delivery in early initiation of breast feeding.

Materials and Methods

Present study is hospital based observational, comparative prospective study which was conducted in Department of Obstetrics and Gynaecology, SMS Medical College & Hospitals, Jaipur from May 2020 to April 2021.Sample size was calculated at 80% study power and alpha error of 0.05, assuming standard deviation 1.96% and confidence interval 95%. 120 subjects in each group were required in sample size which was increased to 130 subjects in each group considering withdrawal of consent/non-response/attrition. The study was conducted on women in their early post-partum period (at 1st hour and up to 24 hours) fulfilling the inclusion and exclusion criteria. Inclusion criteria were elective uncomplicated caesarean delivery and normal vaginal deliveries, Para two women having experience of breast feeding in previous delivery, singleton viable pregnancy of gestational age ≥37 wks., APGAR ≥7 at 5min and baby shifted to mother within first hour. Exclusion criteria were high risk pregnancies, instrumental deliveries, mothers in whom breastfeeding is contraindicated and baby having any physical or medical problem which hampers breastfeeding.

The selected cases were divided into 2 groups

- CD Group (n=120): women who delivered by caesarean section.
- VD Group (n=120): women who delivered by vaginal

route.

All caesarean section were done under regional anesthesia (SAB) and subjected to receive two doses of antenatal corticosteroid (if caesarean section done before 39 week of gestation). Baby condition was noted just after delivery.3 ml of venous Blood sample of mother at 1st hr and 24th hr after delivery was collected in a labeled plain vial. The serum was separated from the blood sample. PRL estimation of the serum was done by prolactin Enzyme Immunoassay.

Data analysis

Data was entered in excel sheet. Continuous data was summarized in form of mean and standard deviation. Difference in mean was analyzed using student't' test on sub-Group analysis. Discrete data was expressed in form of proportions and difference in proportions was analyzed using chi-square test. The level of significance was kept 95% for all statistical analysis.

Results

The baseline characteristics of the whole Study cohort are given in Table 2. Mean age of participants of CD Group was 26.78 ± 4.04 years, mean age of participants of VD Group was 26.38 ± 3.69 years. There was no significant difference between the participants of both the groups in terms of age (p-value=0.424), resident area (p-value=0.221), socioeconomic status (p-value=0.569), education (p-value=0.530), gender of the baby (p-value=0.897), baby weight (p-value=0.652) and APGAR score at 5 minute (p-value=0.675). Caesarean section group (CD Group) had higher educational and socioeconomic status. Mean period of gestation (POG) of participants of CD Group was 38.97±0.81 weeks, mean POG of participants of VD Group was 39.42±1.08 weeks. Caesarean delivery was done at an earlier gestation age as compared to normal delivery.

Mean serum prolactin level at 1st hr and 24th hr of participants of CD Group was 259.68 ± 33.99 and 309.99 ± 42.27 respectively. The mean serum prolactin level at 1st hr and 24th hr of participants of VD Group was 304.91 ± 42.07 and 333.34 ± 42.65 respectively. Difference in mean serum prolactin level at 1st hr and 24th hr of participants of each group was found to be statistically significant (p- value<0.05). We observed higher S. prolactin level in patients delivered via the vaginal route at 1st hr as well as at 24th hr. Mean change in serum prolactin from 1st hr to 24th hr in participants of CD Group was 50.31 ± 23.66 which was higher than participants of VD Group (28.43 ± 25.00).

Table 1: Baseline characteristics of women with caesarean delivery (CD Group) and vaginal delivery (VD Group)

Baseline characteristics	CD Group	VD Group	p-value
Maternal age	26.78±4.04	26.38±3.69	0.424
Residence			
Rural	36 (30)	46 (38.3)	0.221
Urban	84 (70)	74 (61.7)	
Socioeconomic class			
Upper	11 (9.2)	7 (5.8)	0.569
Upper Middle	16 (13.3)	13 (10.8)	
Lower middle	58 (48.3)	54 (45)	
Upper Lower	24 (20)	30 (25)	
Lower	11 (9.2)	16 (13.3)	
Educational Status			
Illiterate	10 (8.3)	13 (10.8)	0.530
Primary School	30 (25)	40 (33.3)	
10th Class Pass	30 (25)	35 (29.2)	
12th Class Pass	27 (22.5)	19 (15.8)	

Graduate	23 (19.2)	13 (10.8)	
Mean period of gestation (POG)	38.97±0.81	39.42±1.08	<0.001

Table 2: Variable for comparison of lactational effect in caesarean delivery and vaginal delivery group

Variables	CD Group	VD Group	p-value
Sex of the baby			
Female	54 (45)	52 (43.3)	0.897
Male	66 (55)	68 (56.7)	
Mean weight of baby (kg)	2.83±0.31	2.85±0.34	0.652
Mean APGAR score at 5 minutes	8±0.76	8.07±0.73	0.488
S. prolactin at 1st hr (ng/ml)	259.68 ± 33.99	304.91 ± 42.07	<0.001
S. prolactin at 24th hr (ng/ml)	309.99 ± 42.27	333.34 ± 42.65	<0.001
Change in S. prolactin level (from 1st hr to 24th hr in ng/ml)	50.31 ± 23.66	28.43 ± 25.00	<0.001

Discussion

In our study we evaluated the role of S. prolactin to compare of early post-partum lactation effects in both groups. In our study mean serum prolactin level at 1st hr of participants of CD CD Group Nd VD Group was 259.68 ± 33.99 and 304.91 ± 42.07 and mean serum prolactin level at 24th hr of participants of CD CD Group and VD Group was and 309.99 ± 42.27 and 333.34 ± 42.65 respectively. Difference in mean serum prolactin level at1st hr and 24th hour of participants of each group was found to be statistically significant (p value <0.05). Our result was coherent with the result observed by Pitilin E de B et al (2020)[9]. They observed the mean serum prolactin level after 1st breastfeeding session (almost at 1st hr) in normal delivery and caesarean section was 299.88 ± 105.11 and 236.88 ± 92.46 respectively and the result was statistically significant (p-value=0.017). In our result we found higher level of s. prolactin in normal delivery as compared to caesarean section at 24th hr also. Similar results were obtained by Isik Y et al (2016)[8], they observed higher level of s. prolactin in normal delivery (284.84 ± 119.22) in compared to caesarean section (295.95 ± 106.81).

In our study the mean change in serum prolactin from 1st hr to 24th hr in participants of CD Group was 50.31 ± 23.66 and the mean change in serum prolactin from 1st hr to 24th hr in participants of VD Group was 28.43 ± 25.00. Erickson EN et al (2020)[101] studied various hormones in breastfeeding mothers and observed change in prolactin level was 26.2 ± 57.7 from start of feeding (311.81 ± 113.6) to 20 min later (340.0 ± 106.2). In our study similar increase in prolactin level was observed in VD Group, although CD Group had higher increased level of prolactin than VD Group.

Wang BS et al (2006)[15] studied the effects of caesarean section on breastfeeding and found There was a significantly lower postpartum prolactin (PRL) level in the caesarean section group (8.48 nmol/L, 95% CI: 7.80 - 9.21 nmol/L) compared with vaginal delivery group (9.61 nmol/L, 95% CI: 8.99 - 10.26 nmol/L) during 6 - 24 hours in the daytime after delivery. Caesarean section was an important hazard for a shorter duration of breastfeeding (RR = 1.21; 95% CI: 1.10 - 1.33) within one year after childbirth. They conclude that caesarean section is associated with significantly lower postpartum PRL, which is in line with the longer breastfeeding initiation and lower rate of successful breastfeeding. Huang SK et al (2020)[16] observed that prolactin levels in

divided participants into the low frequency breastfeeding group (Group I) and high frequency breastfeeding group (group II) and found that the mean basal serum PRL level was significantly greater in Group II (116.4 – 11.8 ng/mL versus 72.7 – 7.77 ng/mL, $p < 0.05$) than in Group I. The increase in post suckling PRL levels was lower in Group II than in Group I (168.5% – 23.1% versus 291.6% – 37.6% of basal PRL, $p < 0.05$). The basal serum PRL level was positively correlated with the number of episodes of suckling ($r = 0.6$, $p < 0.05$). Similar result that Increase latching had increase s. prolactin level were also observed by Feng Z et al (2016)[17] which stated that If the suction pressure applied by infant is high, the increment in average prolactin level is high. They observed increase in s. prolactin level (lg/L) 56.29 (23.64-95.60) after sucking.

Conclusion

Mode of delivery has a direct impact on maternal s. prolactin level. Elective caesarean delivery was associated with lower serum prolactin level, in early post-partum period especially during 1st hr as compared to vaginal delivery, which is in line with the longer breastfeeding initiation and lower rate of successful breastfeeding. We should develop appropriate strategies to reduce the CS rate in our region and additional guidance for mothers and their families are necessary to achieve better breastfeeding outcomes.

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