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CORRELATION BETWEEN MATERNAL PROLACTIN LEVEL AND CORD BLOOD PROLACTIN AND COMPARISON OF PROLACTIN LEVEL IN NEWBORNS DELIVERED FROM NORMAL PREGNANCY AND PREGNANCY WITH COMPLICATIONS

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Abstract:

Objectives: *This research work carried out to examine the association between maternal prolactin level and CBP (Cord Blood Prolactin), the association between Cord Blood Prolactin and weight at the time of birth and to provide the comparison of the Cord Blood Prolactin in newborns of females having normal pregnancy and the females present with complicated pregnancy as gestational Hypertension GDM (Gestational Diabetes Mellitus) and preterm labor.*

Methodology: *The duration of this study was from August 2019 to November 2019. In this research work, we included 32 females who delivered at Children Hospital, Lahore and their thirty-two newborns. We collected 5 ml blood before labor and also took 5 ml cord blood after expulsion of placenta. The utilization of the fluorescence immunoassay was carried out for the analysis of the prolactin level of maternal and cord blood.*

Results: *The level of cord blood prolactin was much high in the neonates born to females with hypertension (405.280 ±77.520 ng/ml) as compared to the females with normal pregnancy (244.8±60.8 ng/ml), P=0.00. The level of cord prolactin in the gestational hypertension group was much higher than the groups of Diabetes Mellitus (P=0.0060) &preterm labor (P=0.00). We found no significant difference in the level of Cord Blood Prolactin in neonates of diabetic females and females with normal pregnancy (299.280 ±37.010, 244.8±60.8 ng/ml respectively, P=0.0530). There was lower cord prolactin in the newborns of preterm labor (204.570 ±22.900 ng/ml) as compared to the newborns of normal pregnancy (244.8± 60.8 ng/ml), but this difference was not significant statistically, P=0.1180. We found a positive association between the cord &maternal prolactin level (P=0.00) and between birth weight &cord prolactin (P=0.0180).*

Conclusion: *Cord Blood Prolactin level is high in the neonates of females with hypertension and low in the neonates of females having preterm delivery. There is no impact of Diabetes Mellitus on the level of Cord Blood Prolactin.*

KEYWORDS: *Preterm, Pregnancy, Diabetes Mellitus, Hypertension, Neonates, Cord, Prolactin, Placenta.*

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INTRODUCTION:

The blood of umbilical cord can be considered as an indicator of fetal environment in uterus and it also shows the levels of hormones of fetal in late gestational period [1]. It is completely non-invasive procedure for the assessment of the fetal circulation without affectation of risks to mother as well as neonate [2]. Characteristically, cord blood is taken just after delivery and the specimens of the cord blood have same quantities of arterials and venous components [3]. Prolactin is a type of the polypeptide hormone, produced by the lactotrophs cells. In human being, encoding is performed by prolactin gene present on the chromosome six. It has involvement in the regulation of the immunity system, angiogenesis and osmoregulation [4]. In the duration of gestational period, pregnant females undergo different physiological alterations involving changes in the profile of hormones [5]. There is rise in the level of prolactin in mothers because of the increase in estrogen & progesterone thus it increases 5 to 10 times of its level present in the normal state without pregnancy [6]. In healthy pregnancy, increase in the maternal prolactin happens gradually from10.0 to 20.0 ng/ml (level before pregnancy) to 200.0 to 400.0 ng/ml at term pregnancy [7]. That same research work discovered that average prolactin level of the cord blood was 276.40 ng/ml in healthy infants [7].

There is association between the prolactin level of the maternal &cord blood and complications of pregnancy as hypertension induced by pregnancy, Gestational Diabetes Mellitus, respiratory distress syndrome and prematurity [6, 8-11]. Different research works have focused on the role of prolactin level of cord blood in the maturity of lung. There is very less data available on the role of level of prolactin in different complications of the pregnancy. The main rationale of this research work was to determine the association between maternal prolactin levels in last three months of pregnancy and prolactin level of cord blood, association between prolactin level of cord blood and birth weight of newborns and to provide the comparison of prolactin level of cord blood in neonates of the females having normal pregnancy and females having complication in pregnancy as Gestational Diabetes Mellitus and premature delivery.

MATERIAL AND METHODS:

This prospective research work was carried out from August 2019 to November 2019 at Children Hospital Lahore. Initially, thirty-five females participated in this research work; three subjects got exclusion because of not meeting with inclusion standard. Remaining thirty-two females delivered thirty-two singletons by normal delivery through vagina, ten among them were present with uncomplicated pregnancy (CG=Control Group), eight were present with gestational Hypertension, seven females were present with Gestational Diabetes Mellitus and preterm was main reason of complication in seven females (Figure-1).

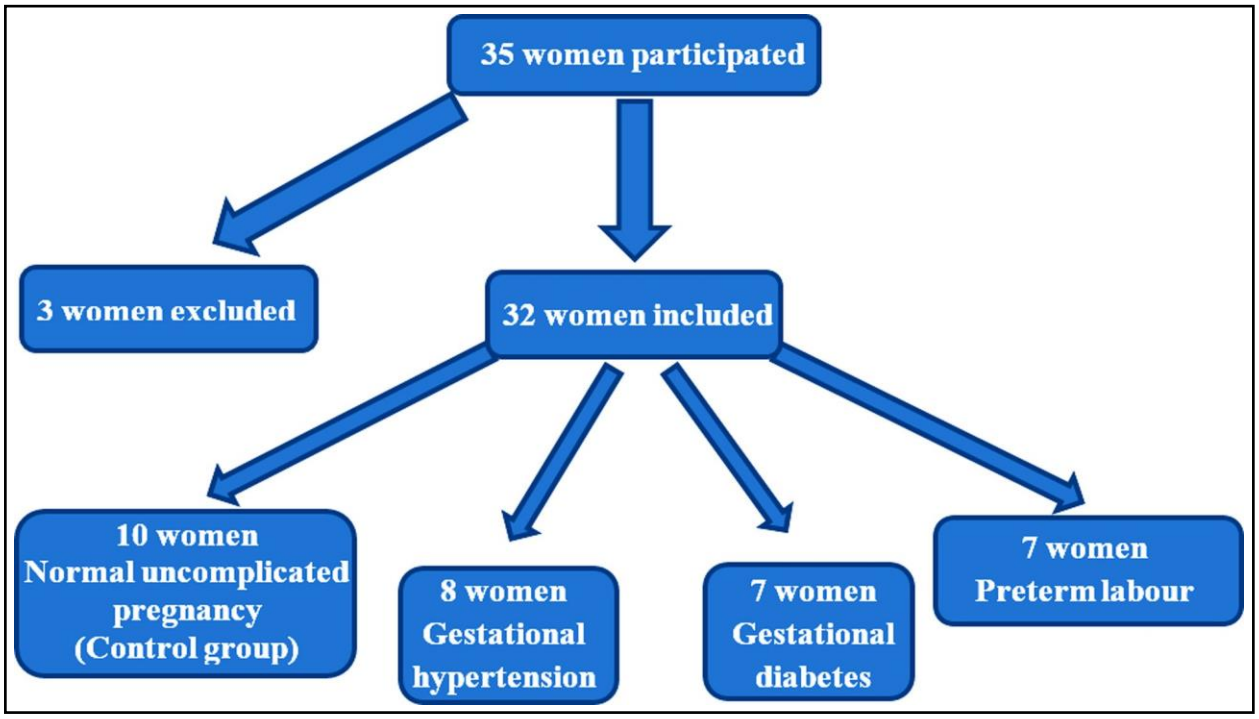

Fig: 1

Ethical committee of the institute gave the permission to conduct this research work and it was in accordance with the Helsinki Declaration. We obtained the written consent from the pregnant females of this research work. Females between eighteen and fourteen years of age, with normal singleton delivery through vagina without congenital abnormalities and having normal test of thyroid function were included in this research work. Females having CS (Cesarean Section) deliveries, twin pregnancies, present with congenital abnormalities, intra-uterine death, and females present with abnormalities of thyroid function and females present with more than one complication of pregnancy were not included in this research work.

We collected the complete history of the patients and thorough examination was carried out. We calculated the gestational age from first day of last menstruation period or by the first ultrasound of the first trimester. We recorded the weight at the time of birth and gender. We considered the females to have Gestational Diabetes Mellitus when FPG (Fasting Plasma Glucose) ≥7mmol/l or HbA1c level≥ 6.50% [12]. We checked the blood pressure of the pregnant females to measure the presence of gestational hypertension among them [13]. We considered the labor as preterm when there was occurrence of delivery before the completion of thirty seventh week of gestation [14]. We took the five ml maternal blood. Just after the delivery, we cut the umbilical cord after clamping. We also collected the 5ml blood of umbilical arterial &venous cord in a plain vial; we kept these sample in refrigerators and analyzed them. We used the standard method to measure the level of prolactin in both types of samples. SPSS V. 23 was in use for the analysis of the collected information. We used the ANOVA for the comparison of the variable of all groups. P value of less than 0.050 was significant.

RESULTS:

This research work included thirty-two females and their thirty-two neonates including 15 males and 17 females. 10 females were present with healthy pregnancies, eight females were present with gestational hypertension, seven females were present with Gestational Diabetes Mellitus and seven females experienced preterm deliveries. The average age of these females was 29.530 ± 3.850 years. Average maternal body mass index was 28.450 ± 1.70kg/m2 and we found no significant difference in body mass index of the females of all groups. There average weight of neonates at the time of birth was 2.96± 0.45kg, there was significant difference in the birth weight of the neonates of all groups as it was much high in case of neonates born to females present with Gestational Diabetes Mellitus as compared to other groups of females (Table-1).

Table-I: Basic Characteristics of Participants

Variable	Uncomplicated pregnancy (n= 10)	Gestational hypertension (n= 8)	Gestational diabetes (n= 7)	Preterm labour (n= 7)	P-value
Age (years)	30.20± 4.56	28± 3.11	30.43± 3.40	29.43± 4.19	0.604
BMI (Kg/m2)	28.83± 1.77	28.04± 1.19	28.49± 2.00	28.33± 2.04	0.817
Birth weight (Kg)	2.99± 0.22	3.01± 0.23	3.44± 0.34	2.37± 0.38	0
Maternal prolactin (ng/ml)	244.50±116.86	317.25±49.61	280.71±44.76	177.28±44.69	0.011
Cord prolactin (ng/ml)	244.80±60.80	405.28±77.52	299.28±37.01	204.57±22.90	0

Mean maternal prolactin level was 255.90± 88.56ng/ml and it was present with much difference between the females of all groups being highest in the females with gestational hypertension (P= 0.0110) as presented in Table-1. Average prolactin level of cord blood of the newborns was 288.040 ±92.460ng/ml and it showed a significant difference between the newborns of all groups being higher in the newborns present with gestational hypertension (P=0.0000) (Table-1).

Table-II: ANOVA Comparisons of Birth Weight, Maternal Prolactin and Cord Blood Prolactin Between Uncomplicated Pregnancies, Gestational Hypertension, Gestational Diabetes and Preterm Labour Groups

			Post-hoc (Gabriel) comparisons of birth weight		
Group	n	Mean ± SD	Uncomplicated pregnancy	Gestational Hypertension	Gestational Diabetes
Uncomplicated Pregnancy	10	2.99 ± 0.22	--	1	0.027
Gestational Hypertension	8	3.01 ± 0.23	1	--	0.056
Gestational Diabetes	7	3.44 ± 0.34	0.027	0.056	--
Preterm labour	7	2.37 ± 0.38	0.001	0.002	0
			Post-hoc (Gabriel) comparisons of maternal prolactin		
Group	n	Mean ± SD	Uncomplicated pregnancy	Gestational Hypertension	Gestational Diabetes
Uncomplicated Pregnancy	10	244.5 ± 116.68	--	0.273	0.908
Gestational Hypertension	8	317.25 ± 49.61	0.273	--	0.924
Gestational Diabetes	7	280.71 ± 44.76	0.908	0.924	--
Preterm labour	7	177.28 ± 44.69	0.394	0.009	0.097
			Post-hoc (Gabriel) comparisons of cord prolactin		
Group	n	Mean ± SD	Uncomplicated pregnancy	Gestational Hypertension	Gestational Diabetes
Uncomplicated Pregnancy	10	244.8 ± 60.8	--	0	0.279
Gestational Hypertension	8	405.28 ± 77.52	0	--	0.006
Gestational Diabetes	7	299.28 ± 37.01	0.279	0.006	--
Preterm labour	7	204.57 ± 22.9	0.606	0	0.021

We conducted the post-hoc comparisons of maternal and cord prolactin levels and birth weight to examine the significance in all groups. Regarding weight at the time of birth, there was presence of significant difference between normal uncomplicated pregnancy group and Gestational Diabetes Mellitus group (P= 0.0270) and between females of group of preterm labor and all other groups of females namely gestational hypertension, uncomplicated pregnancy and Gestational Diabetes Mellitus (P= 0.0010, P= 0.0020 and P=0.0000 correspondingly). Regarding the level of maternal prolactin, the only significant disparity was present between groups of gestational hypertension and preterm labor (P= 0.0090). Regarding the prolactin level of cord blood, there was presence of differences between the gestational hypertension group and other groups of females as Gestational Diabetes Mellitus, uncomplicated pregnancy and preterm labor (P= 0.0000, P= 0.0060, P=0.0000 respectively).

There was also significant difference between the groups of preterm labor and Gestational Diabetes Mellitus (P= 0.0210) as elaborated in Table-2. The prolactin level of cord blood was much low in the group of females with preterm labor as compared to the group of females with uncomplicated pregnancy, but this difference was not much significant (P= 0.1180) as elaborated in Table-3.

Table-III: Comparison of Cord Blood Prolactin Between Uncomplicated Pregnancy and Gestational Hypertension, Gestational Diabetes and Preterm Labour

Variable			P-value
Cord blood prolactin (ng/ml)	Uncomplicated pregnancy (n= 10) 244.80±60.80	Gestational hypertension (n= 8) 405.28±77.52	0
Cord blood prolactin (ng/ml)	Uncomplicated pregnancy (n= 10) 244.80±60.80	Gestational diabetes (n=7) 299.28±37.01	0.053
Cord blood prolactin (ng/ml)	Uncomplicated pregnancy (n= 10) 244.80±60.80	Preterm labour (n= 7) 204.57±22.90	0.118

n: number. Variables were expressed as mean± standard deviation. Independent sample T test was applied.

The level of cord blood prolactin stated no significant differences between the neonates of both genders (291.060±88.780, 285.370±98.240 ng/ml respectively, P=0.8650). We also observed a positive association between the prolactin level of maternal and cord blood (r=0.6030, P=0.0000), there was also positive relation of cord blood with the weight at the time of birth (r=0.4160, P=0.0180) (Table-4).

Table-IV: Correlations of Cord Blood Prolactin with Maternal Prolactin, And with Birth Weight

	Cord blood prolactin (ng/ml)	
	r	P-value
Maternal prolactin (ng/ml)	0.603	0
Birth weight (Kg)	0.416	0.018

Pearson correlation test was applied.

DISCUSSION:

In this current research work, we measured the prolactin level in maternal and cord blood and we also conducted the comparison of the prolactin level of cord blood in various groups. There was higher birth weight of the newborns of females present with Gestational Diabetes Mellitus. This outcome is in agreement with the other research works [15, 16]. There was lower birth weight of preterm neonates as compared to the other groups or babies with full term [17]. Maternal prolactin level was much higher in the females with gestational hypertension as compared to the females with preterm labor; some other research works have discovered the high level of prolactin in the females suffering from hypertension [8, 18]. There was higher level of cord blood prolactin in the females of gestational hypertension group as compared to the other groups of females. The comparison of the prolactin level of cord blood between group of uncomplicated pregnancy and gestational hypertension showed that there was higher level of prolactin of cord blood in the new births born to the females having hypertension. This result is similar with the findings of Marlettini MG [8].

If there is increase in the prolactin level in the duration of pregnancy of females with hypertension, it can reduce the production of nitric oxide thus rise the BP (Blood Pressure), showing the participation of the prolactin in the pathogenesis of gestational hypertension [19]. However, Gaikwad V [9] and Patil B [11] stated with females suffering from hypertension delivered babies with lower level of cord blood prolactin as compared to the females having normal pregnancy. We found no statistically significant difference in the level of cord blood prolactin in uncomplicated pregnancy and in females with Gestational Diabetes Mellitus and this finding is in agreement with the other research works [2]. There was no significant disparity in the level of prolactin between both genders. This is opposite to the research work which discovered that there was higher level of prolactin in females as compared to males, but this finding is in agreement with the results of the research works which stated that there was no difference in prolactin level of both genders. There was positive association between prolactin level of maternal and cord blood and between weight at the time of birth and level of cord blood prolactin as agreed by some other research works.

CONCLUSION:

There is positive correlation between the maternal and Cord Blood Prolactin levels. There is high level of Cord Blood Prolactin in the pregnancies complexed by hypertension as compared to normal pregnancies, pregnancies in the females having Diabetes Mellitus and preterm labor. There is low level of cord prolactin is in the females with preterm labor. There is no impact of gestational Diabetes Mellitus on the level of cord blood prolactin. This research work can help the available literature to understand the role of level of prolactin in the pathogenesis of the complications related with pregnancy which might be helpful to utilize the prolactin as an indicator for the outcomes of pregnancy.

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