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MORPHOLOGICAL AND MORPHOMETRIC ANALYSIS OF PLACENTA IN NORMAL AND PREECLAMPTIC PARTURIENTS: A CROSS SECTIONAL STUDY.

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ABSTRACT:

BACKGROUND: Placenta is the vital, highly vascular unique organ develops from the contribution of both fetus and mother for provision of nutrients to developing fetus **OBJECTIVE:** To observe and compare the placental morphometric parameters in normal and preeclamptic parturients. **METHODOLOGY:** This cross-sectional study was conducted from August 2019 to July 2020 at Department of Anatomy of Liaquat University of Medical and Health Sciences, Jamshoro. A total of 122 placentae; 61 from controls and 61 from preeclamptic were collected from labor room immediately after delivery along with 5cm of umbilical cord attached to it. After noting demographic data and fetal weight from hospital record on predesigned proforma, morphometric examination of placenta was performed and recorded for statistical analysis on SPSS version 23. **RESULTS:** The mean and standard deviation of maternal age, body mass index, gestational age and parity shown in Table 1. Frequency and percentage was calculated for mode of delivery, 53 placentae were collected from normal vaginal delivery and 69 by caesarian section shown in figure 1. The shape of placenta was discoid and umbilical cord was inserted centrally in majority of cases shown in Figure 2. Placental weight when compared in two groups, was found statistically significant ($p < 0.01$). Similarly fetal weight, diameter, thickness, volume and cotyledon count were also statistically significant, while placental coefficient and fetoplacental ratio were not statistically significant shown in Table 2. **CONCLUSIONS:** This study reveals significant difference in various morphometric parameters in placentae of preeclamptic in comparison of placentae from normotensive parturients.

KEYWORDS: Feto-placental ratio, Placenta, Preeclampsia, Morphometry

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INTRODUCTION

Placenta is the vital, highly vascular unique organ develops from the contribution of both fetus and mother for provision of nutrients to developing fetus [1]. Placenta with mother and fetus, establish a triad of functional balance; any dysfunction in one of them can endanger the others [2]. It is the window of pregnancy directly reflecting the story of all the normal and abnormal milestones of antenatal period [3]. Abnormal development of placenta has several negative effects on fetomaternal health, such as preeclampsia and diabetes in mother and intra uterine growth retardation and low Apgar score in fetus [4].

Pre-eclampsia (PE) is the prototype hypertensive disorder of pregnancy occurs due to defective placentation leading to uteroplacental vascular insufficiency. It is diagnosed after 20 weeks of pregnancy and is one of the leading causes of maternal and fetal mortality and morbidity worldwide, accounting for 16% of direct maternal deaths [5]. In routine practice placenta is treated as waste and discarded after the delivery of fetus. A systematic examination of placenta is often ignored by health care personnel [6]. Due to inadequate knowledge, poverty and healthcare facilities in developing countries parturients are referred to tertiary care hospitals at the time of delivery without any antenatal checkup and investigations. Examination of placenta in such circumstances provide robust clue for clinical relevance and its impact on fetomaternal outcome [7].

Therefore this study is intended to examine the morphometric changes in placentae of preeclamptic pregnancies in comparison to normal pregnancy.

MATERIAL AND METHOD

This cross sectional study was conducted from August 2019 to July 2020 at Department of Anatomy of Liaquat University of Medical and Health Sciences, Jamshoro. A total of 122 placentae were studied 61 from normal as control and 61 from preeclamptic parturients. Placentae were collected from labor room of Liaquat University Hospital, immediately after delivery either normal vaginal or by cesarean section with 5cm of umbilical cord attached with it. After entering demographic data and fetal weight from hospital record in predesigned proforma, morphometric examination of placenta was performed and recorded for statistical analysis. After removing placental membranes and tagging with identification code, placentae were

washed with running tap water, the shape and site of insertion of umbilical cord was noted. Each placenta was weighed on automatic weighing scale; thickness was assessed by piercing tooth pick at site of maximum thickness, volume by water displacement method. The diameters of placentae were measured by taking the average of two maximum diameters of placentas with measuring tape in centimeters [8]. The cotyledons were counted from maternal side by looping method. The feto-placental ratio was calculated by dividing fetal weight with placental weight in grams and placental co-efficient by dividing placental weight with fetal weight in grams [9]. All the findings were recorded on predesigned proforma. Data was analyzed using SPSS version 23. Categorical variables were presented as frequencies and percentages. Mean and standard deviation was calculated for quantitative variables and compared between normal and preeclamptic by applying independent t test. Results were considered significant < 0.05 in all analyses.

RESULTS

The basic demographic of parturients were presented as mean and standard deviation (SD) or frequency and percentage. The mean and standard deviation of maternal age, body mass index, gestational age and parity were 32.73±5.9 years, 33.06±3.9, 37.3±3.6 weeks and 3±1 respectively shown in Table No. 1.

Frequency and percentage were calculated for mode of delivery, 32 placentae from controls and 21 from preeclampsia were collected from normal vaginal delivery while 29 from control and 40 from preeclampsia were delivered by caesarian section, in total 53 from normal vaginal delivery and 69 by caesarian section shown in figure 1. Regarding shape of placenta and site of insertion of umbilical cord in control 55 placentae were of discoid shape and 06 were round/oval and umbilical cord in 48 cases was inserted centrally while in 11 cases eccentrically and 02 shows marginal insertion. Among 61 placentae from preeclamptic parturients 48 placentae were of discoid shape while 13 were oval/ round and umbilical cord in39 of them was inserted centrally, in 16 eccentric and in 06 marginal shown in Figure 2. Placental weight when compared in two groups, it was 463.28 ±92.186 gms in control and in preeclampsia 336.23 ± 73.23gms ($p < 0.01$). Similarly fetal weight, diameter, thickness, volume and cotyledon count when compared in two groups were statistically significant, while placental coefficient and fetoplacental ratio when compared in two groups were not statistically significant shown in Table 2

Table 1 Demographic characteristics of study population

	Control (n=61)	Preeclampsia (n=61)	Mean± SD (n=122)
Maternal Age (in years)	34.40±1.8	31.08±7.9	32.73±5.9
Body Mass Index	31.29±3.8	34.83±3.1	33.06±3.9
Gestational Age (in weeks)	39.90±3.2	34.76±1.7	37.3±3.6
Parity	4±1	3±1	3±1

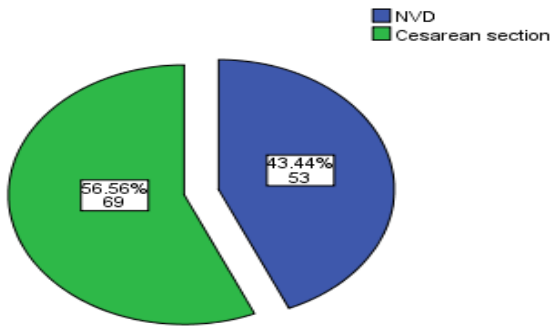

Figure 1 Showing mode of delivery of study population

Figure 2 Shape and site of insertion of umbilical cord

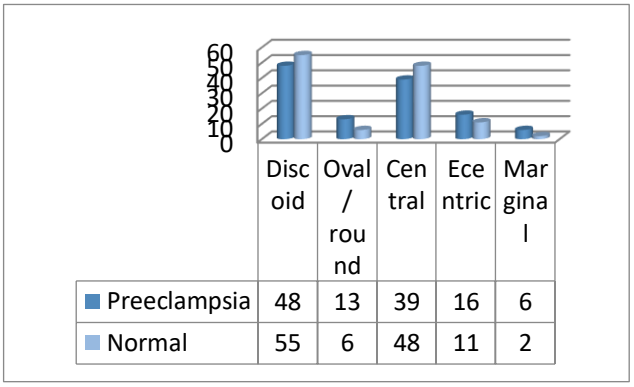

Table 2 Placental parameters in control and preeclamptic

Parameters	Groups	Mean	Std. Deviation	Std. Error Mean	P value
Placental Weight	Preeclampsia	336.23	73.323	9.516	<0.01**
	Control	463.28	92.186	11.803	
Fetal weight	Preeclampsia	2223.59	378.320	61.255	<0.01**
	Control	2883.61	563.377	72.133	
Placental coefficient	Preeclampsia	.1534	.04626	.00592	0.79
	Control	.1552	.02566	.00329	
Feto-placental ratio	Preeclampsia	6.9885	2.43555	.31183	0.63
	Control	6.3313	1.25636	.16086	
Diameter	Preeclampsia	12.3133	1.85494	.23750	<0.01**
	Control	18.9836	3.84054	.49173	
Thickness	Preeclampsia	2.3256	.51026	.06533	<0.01**
	Control	2.7082	.20599	.02637	
Volume	Preeclampsia	3.2902	23.45811	3.00350	<0.01**
	Control	4.4859	37.76964	4.83591	
No. of cotyledons	Preeclampsia	17.7705	1.80179	.23070	<0.01**
	Control	22.3607	2.83451	.36292	

DISCUSSION

The placenta is a pregnancy-specific organ which goes through several morphometric alterations in response to threat for survival. Abnormal placentation is the root cause of PE, leading to placental insufficiencies which jeopardize the developing fetus. As maternal and fetal status is reflected in placenta, in-depth studies of placenta provide valuable clues regarding fetal development [9]. Regarding shape of placenta discoid was found in 55 controls and in PE 48, while oval/round was found in 06 controls and 13 PE. Umbilical cord was inserted centrally in 48 cases in controls and

39 in PE. In 11 cases eccentric and in 02 cases marginal insertion was found in controls. In PE 16 eccentric and 06 marginal insertions of cord were observed. Other studies from Pakistan and India also report both shapes in normal and preeclamptic placentae with predominantly discoid shape and central insertion of umbilical cord [10, 11.]

Placental weight forecast the fetal birth weight because fetus depends on it via fetomaternal circulation; both are growing simultaneously. The weight of the placenta is directly proportional to the weight of new born. Current study reveals marked difference in placental and fetal weight between control 463.28±92.186 and 36.23±73.323 in PE, while fetal weight in control was 2883.61±563.377 and in preeclampsia was 2223.59±378.320 statistically significant difference in two groups when compared which is in line with studies reported by and Gyan and Sankar KD et al. both reported placenta from preeclamptic parturients were lighter and low birth weight of new born than normal [11, 12].

The placental coefficient and fetoplacental ratio was found non- significant when compared in both groups in current study, similar is reported by Shekhar Kumar. Study conducted by Mahare and Kebede found significant difference in control and PE, attributed to different statistical test [1, 13]

Regarding diameter and thickness current study reports 18.9836±3.84054 cms and 2.7082 ± 0.20599 cms respectively in controls while in PE it was 12.3133±1.85494cms and 2.3256±0.51026 cms respectively. The same results were stated by Naheed and Segupta from Bangladesh who reports preeclamptic placentae are significantly smaller in diameter and are less thick than controls. The number of cotyledons in preeclampsia was 17.7705±1.80179 and in controls were 22.3607±2.83451 while study conducted by Naheed reports slight less number of cotyledons in 16 ± 0.78 in PE and 17.10±0.89 in controls [14, 15]

The volume of placenta was 3.2902±23.45811 ml in PE and 4.4859 ±37.76964 ml in controls which is statistically significantly same was observed by Nag and Akshara. [16, 17]

V. CONCLUSION

Preeclampsia is a common hypertensive disorders which adversely impact fetomaternal wellbeing. Health care personnel should be encouraged for performing meticulous examination of placenta for its clinical correlations with disease and demise.

FUTURE RECOMMENDATIONS

This study will provide preliminary data for further studies on placental changes in preeclampsia and enable us to build our data-based information for local and international references.

ETHICS APPROVAL: The ERC gave ethical review approval

CONSENT TO PARTICIPATE: written and verbal consent was taken from subjects and next of kin

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