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Morphological Comparison Of Umbilical Cord In Normotensive Pregnancies & Pregnancies Complicated By Mild & Sever Pregnancy Induced Hypertension In District Dera Ismail Khan

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Abstract

Background: Pregnancy induced hypertension is regarded as a risk factor in pregnancy and it adversely affects the development of placenta & umbilical cord and growth of fetus. Gross morphological changes of umbilical cord were compared in normotensive pregnant women with patients of pregnancy induced hypertension. Objective of the study was to observe different morphological parameters in umbilical cord like cord insertion, cord length, diameter & true knots in umbilical cords in normotensive patients & to compare these parameters with that of hypertensive pregnant females.

Study design: A Case-control observational study.

Palace And Duration Of Study. Department of anatomy. Gomal medical College DIK from January 2020 to October 2020

Material & Methods: This was a case control analytical study, conducted at Anatomy department Gomal Medical College, Dera Ismail Khan, Pakistan, from January 2020 to October 2020. Convenient non random sampling technique was used.

A total of 150 placentae with umbilical cord were collected after delivery and divided into three groups A, B and C each of size 50. Group A was control, group B was mild hypertensive patients and group C was severe hypertensive patients. Four research variables; insertion of umbilical cord, length of umbilical cord (cm), diameter of umbilical cord (cm) & knots in umbilical cord were measured on ratio scale for three groups. Structured proforma was used to record presence

of PIH or otherwise after informed consent from patient. Umbilical cord length & diameter were measured in terms of mean ±SD, whereas categorical derivatives such as insertion site & true knots were measured as percentages. Student T test was used in Social Sciences Online Calculator.

Results: Umbilical cord insertion was central in 32%, 24% & 32% , eccentric in 64%, 64% & 56% while marginal insertion was noted in4%, 12% & 12% cases in group A, B & C respectively. While comparing umbilical cord length and diameter statistically significant reduction was noted among group A, B and C (p=0.000). No true knots were observed in any group.

Present study revealed that PIH adversely affects the morphology of umbilical cord.
Key words: Umbilical cord; morphology; pregnancy induced hypertension; pregnancy, women; length; insertion; knots; diameter.

INTRODUCTION:

Placenta is the vital organ responsible for normal growth of fetus and its survival. Exchange of the blood gases, wastes and nutrients takes place through placenta between mother and fetus. The placenta is the fastest growing organ during pregnancy.[1] Placenta is sometimes described as a mirror of prenatal period and is a vital organ for maintaining the pregnancy, providing essential nutrients to the fetus and removing the waste products from the fetus and thus promoting normal fetal development.[2] PIH adversely affects the development of placenta & umbilical cord & thus affects the growth of fetus.Pregnancy induced hypertension is the development of hypertension after 20th week of pregnancy in previously normotensive female and no significantly detected proteins in urine.[3] Pre-eclampsia is development of hypertension after 20th week of pregnancy and significantly detected proteins in urine. Proteinuria is considered as significant when amount of protein excreted in 24-hour urine sample are greater than 300mg. [3] clampsia is a convulsive condition (tonic clonic) associated with pre-eclampsia. [3] Hypertension during pregnancy causes nearly 12% of maternal deaths in world. [4,5] In United States it accounts for 15.9% maternal mortality. [6] Every year 585,000 maternal deaths occur due to complications of pregnancy and labor. More than 99% deaths occur in less well-developed countries.[7, 8] The study conducted in Lahore showed the prevalence rate of hypertensive disorders to be 3.2%. Out of these patients 70% have gestational hypertension, 21% with pre-eclampsia and 9% with chronic hypertension.[9] Another study from Peshawar in year 2003 reported a prevalence of 1.65%[10] In rural areas of Pakistan about 75% population is living where they don't have proper antenatal care facilities and most of them present to tertiary care hospital with complications of pregnancy. [11] Placenta and its umbilical cord are also affected by complications of pregnancy which is evident by changes in their gross morphology. [12] The objective of the study was to compare the umbilical cord insertion, length, diameter & true knots in cord in patients of normotensive pregnancy to that of pregnancies complicated by PIH.

Materials and methods:

This case control analytical study was conducted at department of anatomy, Gomal Medical college, D. I. Khan. The duration of study was10 months from January 2020 to October 2020. The advanced study and research board (ASRB), Khyber medical university Peshawar, Pakistan approved this study according to guidelines of ethical committee. Informed written consent was taken from patients for their participation and publishing their data in the present study. Consecutive non-probability sampling technique was used. A total of 150 laboring women of all ages and parity of pregnancy induced hypertension (PIH) and normotensive pregnant women from the labor room of Zanana hospital district head quarter teaching hospital (DHQTH) D.I.Khan. Placentae with the cord were collected after delivery from patients. Patients were divided into three groups. Group A was 50 normotensive pregnant females as control. Group B was 50 patients with mild PIH. Group C was 50 patients with severe PIH. Patients having mild and sever PIH and normotensive pregnant women as control were taken as inclusion criteria. Two research variables; length of umbilical cord (cm) & diameter of umbilical cord (cm) were measured on ratio scale for three groups. Two discrete variables : knots in umbilical cord & insertion of umbilical cord were measured as percentages.Placentae with umbilical cord were collected from labor room immediately after delivery and preserved in 10% formalin. Samples were shifted to anatomy

department, Gomal Medical College for inspection. After shifting of placentae following gross morphological features were studied. Placentae were washed with normal saline to remove blood clots, gently pressed with hands to remove extra blood & mopped with cotton. Insertion point of cord was noted and then was cut nearest to its point of insertion from placenta. Part of the cord attached to the fetus and part attached with placenta were measured and added and taken as total length of umbilical cord and expressed in centimeters. Diameter at a point of maximum thickness and diameter at a point of minimum thickness were measured. Mean of the two was taken as diameter of the cord and expressed in centimeters. Presence or absence of true knots present in the cord were noted. The data was entered into SPSS (Statistical Package for Social Sciences) version 16.0 for analysis. The quantitative variables were expressed in terms of mean ± SD and qualitative variables were expressed in terms of percentages. Student- t test was used for quantitative variables. One way-ANOVA was applied while comparing more than two groups. All the statistical analysis was performed as suggested by Steel et al., 1997.[61] A p-value of ≤ 0.05 will be considered significant.

Results :

Cord insertion was eccentric in about 64%, 64% and 56% in group A, B and C respectively, while in 32%, 24% and 32% cases cord insertion was central in group A, B and C as shown in table 1 respectively. Marginal insertion was observed in 4% cases in group A, 12% case in group B and 12% cases of group C.

Table 1
Comparison of morphology of umbilical cord in different groups

S/Case No:	PARAMETERS		CONTROL GROUP	MILD PIH	SEVER PIH
1-	Insertion of umbilical cord	Central	32%	24%	32%
		Eccentric	64%	64%	56%
		Marginal	4%	12%	12%
		Velamentous	0%	0%	0%
2-	Mean cord length (cm)		57.18±1.139	51.3±0.972	43.04±1.16
3-	True knots		Absent	100%	100%
			Present	0%	0%
4-	Mean umbilical cord diameter (cm)		1.139±0.06	1.16±0.041	0.94±0.046

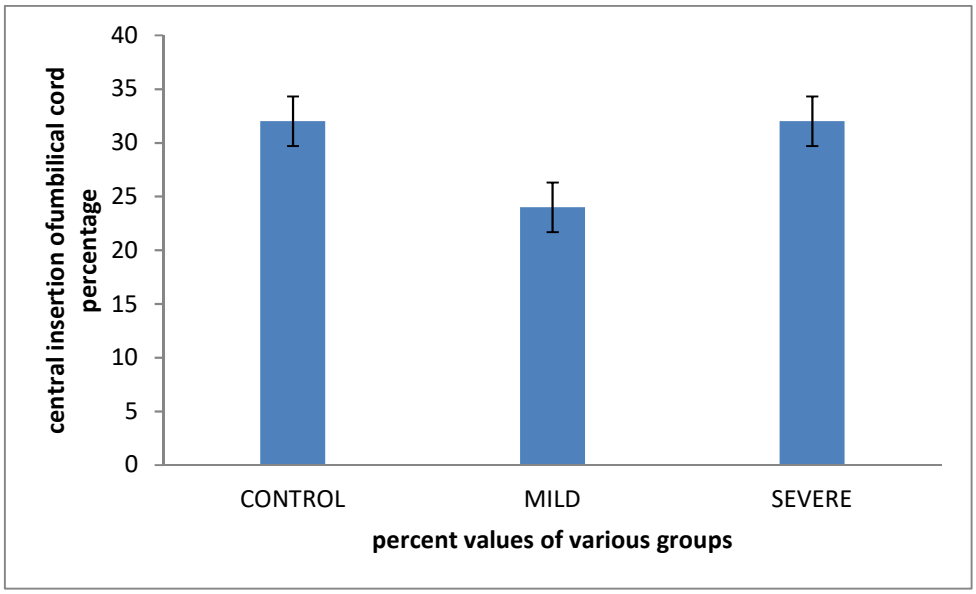


Figure 01:central insertion of umbilical cord in different groups

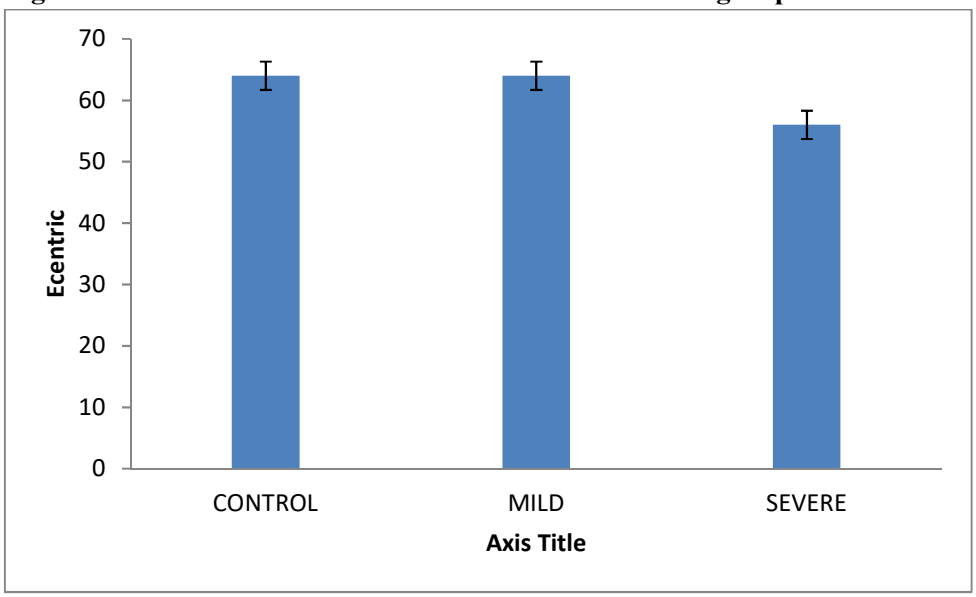


Figure 02:Bar graph showing percentages of eccentric insertion of umbilical cord in all groups

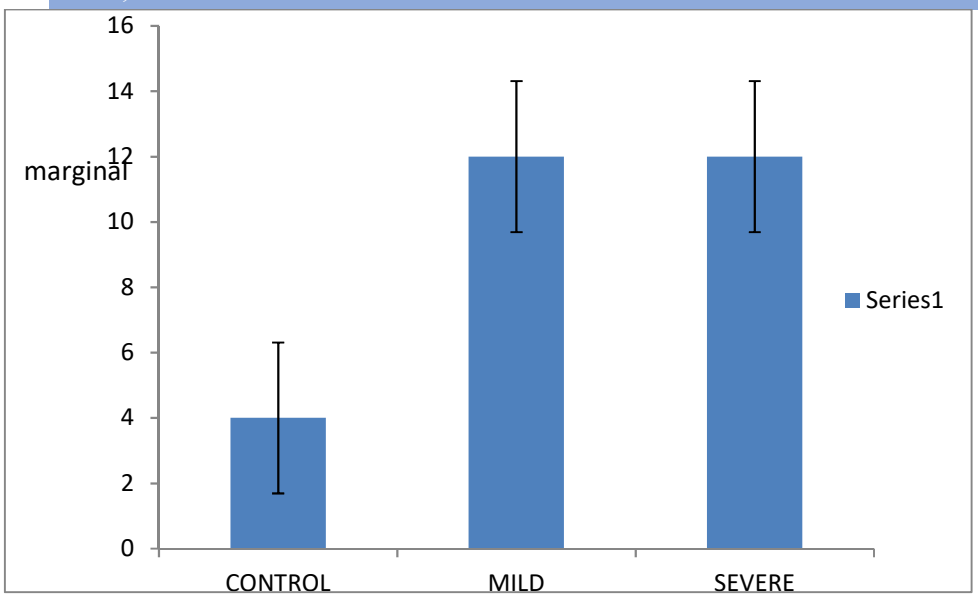


Figure 03: Bar graph showing percentages of marginal insertion of umbilical cord in different groups

According to data of table 1, mean lengths of umbilical cord in group A, B and C were 57.18±1.139, 51.3±0.972 and 43.04±1.16 respectively. P value as shown in table 2 between group A and B was 0.001 which is statistically significant. P value between group A and C as shown in table 3 was 0.000 which is statistically highly significant. Table 4 describes comparison between group B and C showed p value of 0.000 which is statistically highly significant.

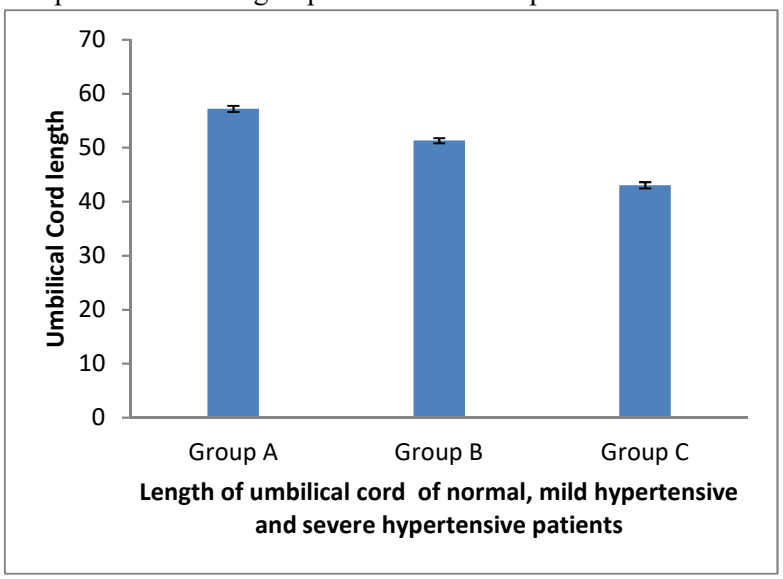
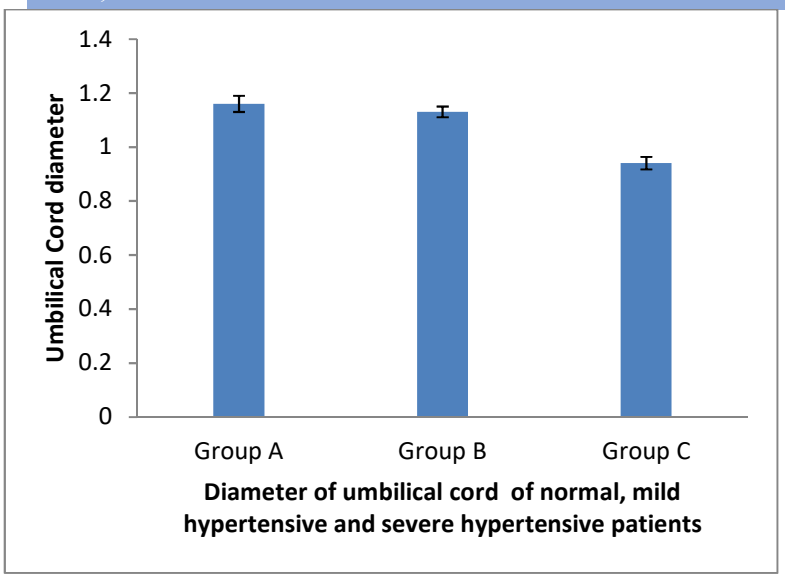


Figure 04:Bar graph showing mean length of umbilical cord in all groups

Umbilical cord diameter

Tables 1 describes mean umbilical cord diameter as 1.139±0.06, 1.16±0.041 and 0.94±0.046 respectively of group A, B and C. According to table 2 p-values calculated between group A and B was 0.779 which is statistically non-significant. Data present in table 3 showed comparison between group A and C, p-value came out to be 0.011 which is statistically highly significant. Table 4 describes p- value between group B and C which is 0.000 and it is statistically highly significant.



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Bar graph showing mean diameter of umbilical cord in all groups

Knots in umbilical cords

No true knots were seen in any case in all the study groups.

Table 2

Comparison of group *A* control vs group *B* mild hypertensive

Parameter	Control	Mild hypertension	t-value	Sig. level
Umbilical Cord length	57.18±1.14	51.3±0.97	3.559	0.001*
Umbilical Cord diameter	1.139±0.06	1.16±0.04	0.282	0.779

Independent t test- *Significant. **highly significant

Table 3

Comparison of group *A* control vs group *C* Sever hypertensive

Parameter	Control	Severe hypertension	t-value	Sig. level
Umbilical Cord length	57.18±1.14	43.04±1.16	8.535	0.000**
Umbilical Cord diameter	1.139±0.06	0.94±0.05	2.629	0.011*

Independent t test- *Significant. **highly significant

Table 4

Comparison of group *B* mild hypertensive vs group *C* Severe hypertensive

Parameter	Mild hypertensive	severe hypertension	t-value	Sig. level

Umbilical Cord length	51.3±0.97	43.04±1.16	5.285	0.000**
Umbilical Cord diameter	1.16±0.04	0.94±0.05	3.885	0.000**

Independent t test- *Significant. **highly significant

Table 5

Analysis of variance:

Parameters	**Control**	**Mild hypertensive**	**severe hypertension**	**Sig. level**
Umbilical Cord length	57.18±1.14	51.3±0.97	43.04±1.16	0.0000**
Umbilical Cord diameter	1.139±0.06	1.16±0.04	0.94±0.05	0.0046**

Independent t test- *Significant. **highly significant

Discussion:

We observed in the present study that in most of the cases insertion site of the umbilical cord was eccentric and central. Only 4% cases in control group and 12% cases in both group B and C has shown marginal insertion. The incidence of marginal insertion of the umbilical cord is statistically significant in both group B and C. These results are in accordance with the results of another study.[13]They also revealed that incidence of marginal insertion of umbilical cord is significantly higher in hypertensive group[13]. We observed that length of umbilical cord decreases significantly in groups B and C while comparing with group A. There is trend of reduction with severity of the disease. Statistically significant decrease in mean cord length was noted in hypertensive group.[1] These findings are in concordance with the present study. Present study showed that mean diameter of umbilical cord also decreases in hypertensive group. While comparing mild hypertensive placentae with control decrease in diameter is statistically non-significant. Comparison of control with sever hypertensive group and comparison between mild and sever hypertensive group have shown significant decrease in cord diameter. These results are in contradiction to the results of the previous study.[14] They have observed no difference in mean cord diameter. This contradiction may be because of the reason that they observed the finding in 30 hypertensive placentae while in present study number of the disease group was 100. There may also be regional and genetic differences in the patients of this area. In our study we found no true knots in umbilical cord in all the three groups which shows it to be non-significant. No true knots were seen in any case in umbilical cord.

Conclusion

pregnancy-induced hypertension changes the structure of the umbilical cord. An increase in hypertension led to shorter and thinner cords, primarily in the most serious cases. Umbilical cord changes can impact the way fetal blood flows and can be important for the baby's health, pointing to the value of checking the umbilical cord.

Limitations

making it difficult to compare regions. Histopathological correlation was not done, and even though some newborns were affected, we didn't look at what happened to them. Since genetic, nutritional, and environmental factors were not controlled, the results may not apply to all groups of people.

Future Findings

These alterations need to be verified through further studies that include more people and different ethnicities. Integration

of information about newborns' health, blood flow studies, and looking at the cord vessels with a microscope would help us understand Parkinson's disease better. Searching for ways to prevent hypertensive pregnancies could be good for the placenta and the baby's health.

Disclaimer: Nil

Conflict of Interest:Nil

Funding Disclosure: Nil

Authors Contributions

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Critical Review: **,Muhammad Hassan khan [7],Mir Shahan Mahsud [8]**

Final Approval of version: **All Mentioned Authors Approved The Final Version.**

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