

## Original Research Article

**Comparative study of Thickness of Wharton's Jelly of Umbilical Cord in Normal and PIH Patients on histological basis by using special stain –PAS stain****Mrinalini Gaikwad<sup>1\*</sup>, Anjali Sabnis<sup>2</sup>, Rahul Kadam<sup>3</sup>**<sup>1</sup>*Assistant Professor, Department of Anatomy, Nootan Medical College, Visnagar, Gujarat, India*<sup>2</sup>*Professor and Head Department of Anatomy, M.G.M Medical College, Kamothe, Navi Mumbai, Maharashtra, India*<sup>3</sup>*Professor, Department of Orthopedic, M.G.M Medical College, Kamothe, Navi Mumbai, Maharashtra, India***Received: 24-11-2021 / Revised: 18-12-2021 / Accepted: 17-01-2022****Abstract****Aim and objectives:** To compare the thickness of Wharton's jelly of umbilical cord in normal and PIH patients on histological basis by using special stain i.e. Pas stain

1. To measure the thickness of Wharton's Jelly of umbilical cord in normal and PIH patients.

2. To measure the thickness of Wharton's Jelly of umbilical in PIH patients.

3. To compare between the thickness of Wharton's Jelly of umbilical cord in normal and PIH patients. **Method:** The study sampled 50 normal placenta with umbilical cord and 50 placenta with umbilical cord from PIH patients are included in the study. After delivery, the umbilical cord with placenta were collected from labour room of MGM Hospital, Kalamboli, Navi Mumbai and fixed in 10% formalin solution. **For Histology:** Standard procedure for staining were used. Slides were prepared and stained with special stain. (PAS Stain). The thickness of wharton's jelly was measured with micrometer eyepiece. **Statistical analysis:** Data is analysed by using statistical software SPSS version -16. **Results:**

1. Special Stain (PAS Stain) was performed for all umbilical cord samples. In normal as well as PIH, we found 2 arteries and 1 vein.

2. PAS stain was used to differentiate Wharton's Jelly from tunica adventitia. The thickness was measured and it was found that Wharton's Jelly is reduced in PIH cases as compared to normal. **Conclusion:** The Wharton's Jelly is reduced in PIH cases as compared to normal.**Keywords:** PIH-pregnancy induce hypertension

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**Introduction**

An umbilical cord is a helical (coiled) structure composed of three blood vessels (two arteries and one vein) surrounded by gelatinous substance the Wharton's Jelly and encased by the strong covering of amniotic epithelium which is a type of squamous epithelium. The developing fetus is connected by a narrow tubular structure, the umbilical cord to the placenta. The Wharton's Jelly binds and encases the umbilical vessels, protecting them from twisting and compression during pregnancy and delivery. It is composed of collagen fibers forming a network of interconnected cavities, cavernous and perivascular spaces in which the ground substance of the Jelly is stored. PIH is one of the hypertension disorders of pregnancy affects about 5 to 8% of all pregnant women worldwide[59][60]. and in India the prevalence is 6 to 20%. In PIH there is a significant increase in the blood pressure without proteinuria that is detected for the first time during mid pregnancy and returns to normal by 12<sup>th</sup> weeks postpartum. PIH is defined as systolic blood pressure 140 mmHg and diastolic blood pressure 90 mmHg in a previously normotensive pregnancy woman who is 20 weeks of gestation and has no proteinuria or no signs of end organ dysfunction. Pre-eclampsia is a multi system disorder of unknown etiology characterized by development of hypertension to the extent of 140/90 mmhg or more with proteinuria and edema induced by pregnancy after the 20<sup>th</sup> week in a previously normotensive. Pre-eclampsia stating as a mild and it worsen to severe and finally transformed into eclampsia. PIH is a pregnancy complication associated with premature delivery, intra-uterine growth

retardation, abruptio placenta and intra-utrine death, as well as maternal morbidity and mortality. The etiology of these disorder is still unknown.

Changes or alterations of any of the Wharton's components have been described or postulated in various pathological conditions like hypertensive disorders, fetal distress, gestational diabetes and fetal growth restriction. Since Wharton's Jelly is an important constituent of cord as it is the metabolically active tissue involved in exchange between amniotic fluid and umbilical vessels and is vital to the outcome of pregnancy. Systemic diseases affecting mother can impose serious impacts on Wharton's Jelly content thus affecting the cord architecture and finally the outcome of pregnancy. Both pediatricians and pathologists know for many years that the amount of Wharton's Jelly is a good predictor of prenatal complications.

Therefore the study aims to evaluate and compare the histological changes in the Wharton's jelly of umbilical cord in normal and PIH.

**Materials and method**

The present study was carried out in the department of anatomy, MGM medical college kamothe, Navi Mumbai after the approval from the institutional ethics committee. The study sampled 50 normal placenta with umbilical cord and 50 placenta with umbilical cord from PIH patients are included in the study.

Consent: Informed consent was taken from all patients as per the standard consent form. After delivery, the umbilical cord with placenta were collected from labour room of MGM Hospital, Kalamboli, Navi Mumbai and fixed in 10% formalin solution.

Tissue section of umbilical cord was taken and block were made from umbilical cord tissue. Slides were prepared by using standard protocol. Special stain (PAS stain) was used to differentiate Wharton's Jelly. The thickness of whaton's Jelly was measured with micrometer eyepiece

\*Correspondence

**Dr. Mrinalini Gaikwad**

Assistant Professor, Department of Anatomy, Nootan Medical College, Visnagar, Gujarat, India

The thickness of Wharton's was measured from tunica adventitia to outer margin at 12, 3, 6, 9 O'.

#### Statistical analysis

Data is analysed by using statistical software SPSS version -16.

#### Observation and results

**The Histological Observation:** Various staining procedures were performed to analyse histology of all umbilical cord samples.

**PAS stain (Periodic Acid-Schiff Technique) alcian blue**

**PAS Stain** were used to measure the thickness of Wharton's Jelly

1. Special Stain (PAS Stain) was performed for all umbilical cord samples. In normal as well as PIH, we found 2 arteries and 1 vein.
2. PAS stain was used to differentiate Wharton's Jelly from tunica adventitia. The thickness was measured and it was found that Wharton's Jelly is reduced in PIH cases as compared to normal.

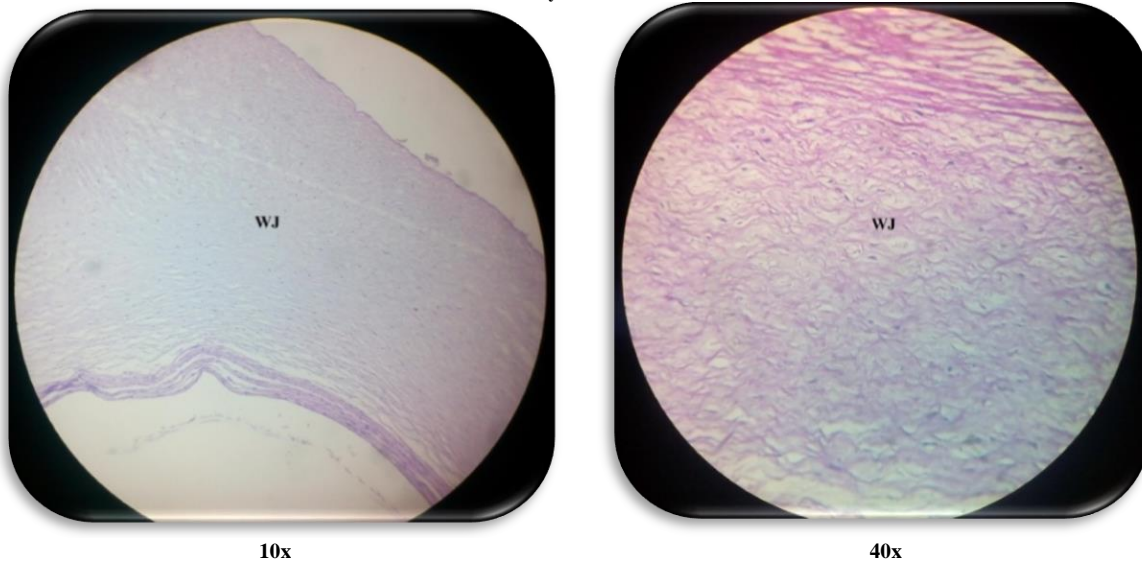


Fig 1: (PAS stain) showing Wharton's Jelly in normal

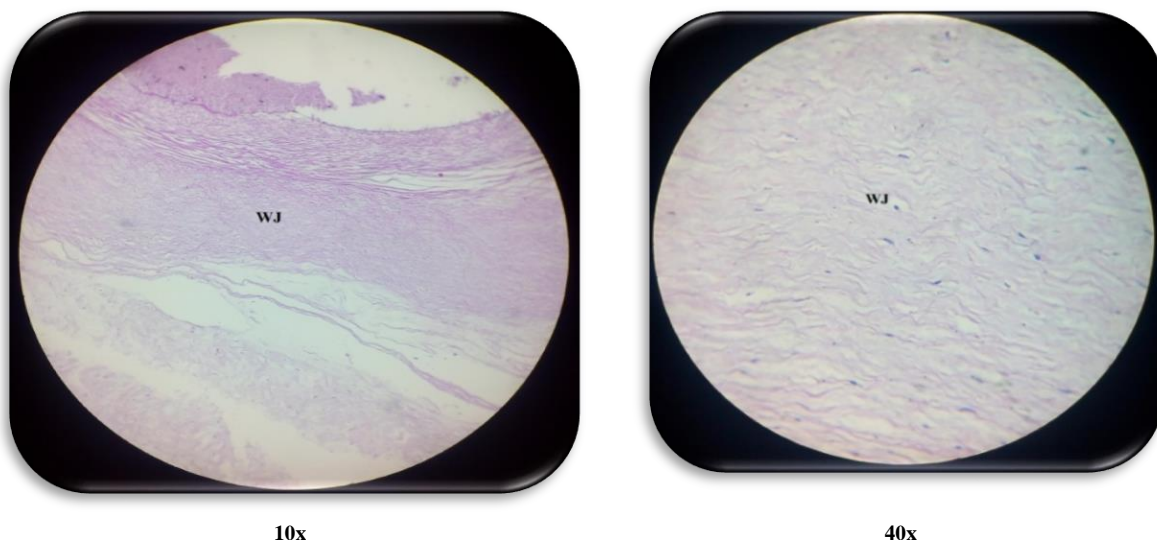
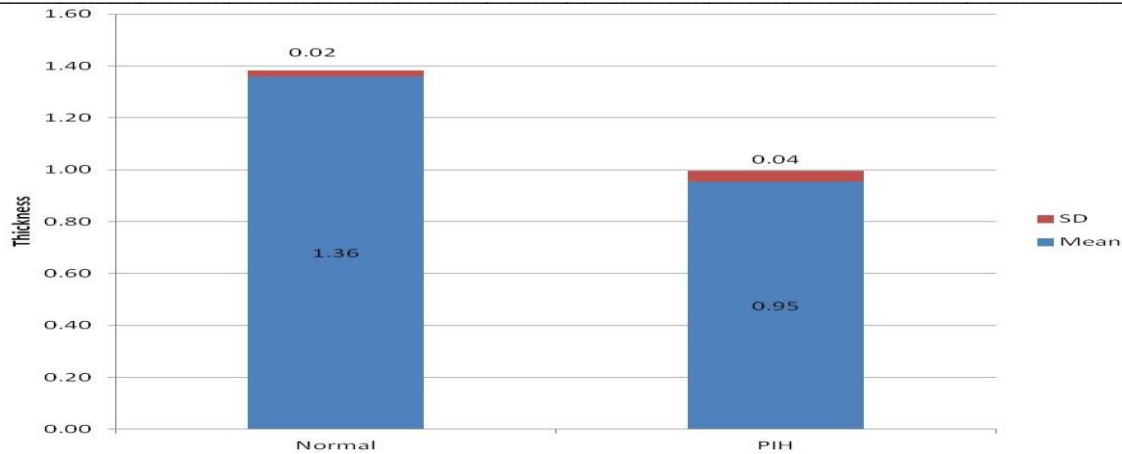


Fig 2: (PAS stain) showing Wharton's Jelly in PIH (WJ)

Table: Comparison of mean thickness of Wharton's Jelly in normal and PIH

Group	Mean	SD
Normal	1.36	0.02
PIH	0.95	0.04



**Fig 1: Comparison of mean thickness of Wharton's Jelly in normal & PIH**

The thickness of Wharton's Jelly is reduced in PIH as compared to normal cases.

### Discussion

We have compared the thickness of Wharton's Jelly in normal and PIH cases. There is no exact demarcation between Wharton's Jelly and tunica adventitia, but the cellular density is less in Wharton's Jelly as compared to tunica adventitia. Also the cells are loosely arranged and away from each other in Wharton's Jelly. We have taken measurements from tunica adventitia to outer margin at 12, 3, 6, 9 O' Clock position and taken mean of that. We used PAS stain which stains blue for Wharton's Jelly. In present study the Wharton's Jelly is reduced in PIH as compared to normal cases. Similar to our study Srivastava 2014, stated there is a significant reduction was found in hypertensive group. Wharton's Jelly is a mucoid connective tissue which is covering the umbilical vessels. Along with the protection of umbilical vessels it is involved in water exchange between amniotic cavity and umbilical vessels. It consists of fundamental amorphous substance containing GAGs (Glucoseaminoglycans), proteoglycan, predominantly hyaluronic acid and cells. Hyaluronic acid entraps large amount of water. Hypertension is associated with significant increase of sulphated GAGs instead of hyaluronic acid which causes reduction in hydration. So it may be the cause for thinning of cord in hypertension.

### Conclusion

From this study it has been concluded that the Wharton's Jelly is reduced in PIH cases as compared to normal.

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