

**ORIGINAL RESEARCH**

# Assessment of relation of umbilical coiling index & the perinatal outcome

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**ABSTRACT**

**Background:** The Umbilical Coiling Index (UCI) is a measurement used in obstetrics to assess the coiling or twisting of the umbilical cord in a fetus during pregnancy. The present study was conducted to assess relation of umbilical coiling index & the perinatal outcome. **Materials & Methods:** 56 healthy women with term gestation were enrolled. By dividing the total number of coils by the total cord length in centimeters, the UCI was calculated. Perinatal factors were recorded. **Results:** Meconium staining was present in all 6 cases of hypocoiling, 23 cases of normocoiling and 10 cases of hypercoiling. The difference was significant ( $P < 0.05$ ). Apgar score at 1 minute  $< 4$  was seen in 6, 12 and 1 and  $> 4$  in 9, 28 and 9 in hypocoiling, normocoiling and hypercoiling cases respectively. Apgar score at 5 minutes  $< 7$  was seen in 6, 30 and 6 and  $> 7$  in 0, 10 and 4 cases of hypocoiling, normocoiling and hypercoiling respectively. IUGR was seen in 1, 19 and 7 and NICU admission in 2, 18 and 1 hypocoiling, normocoiling and hypercoiling cases respectively. The difference was significant ( $P < 0.05$ ). **Conclusion:** UCI [90th percentile of the umbilical cord (hypercoiling)] is associated with IUGR, and UCI 10th percentile of the cord (hypocoiling) is associated with low Apgar scores at 1 and 5 minutes, respectively, and meconium staining.

**Key words:** Hypocoiling, Normocoiling, Umbilical Coiling Index

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**INTRODUCTION**

The Umbilical Coiling Index (UCI) is a measurement used in obstetrics to assess the coiling or twisting of the umbilical cord in a fetus during pregnancy.<sup>1</sup> The umbilical cord is the lifeline that connects the developing fetus to the placenta, providing oxygen and nutrients necessary for the baby's growth and development. In some cases, the umbilical cord can become coiled or twisted.<sup>2</sup>

The UCI is a numerical value that quantifies the degree of coiling of the umbilical cord. It is typically expressed as the number of complete coils per centimeter (cm) of the cord's length.<sup>3</sup> For example, an UCI of 0.3 means that there are three complete coils in every 10 cm of the umbilical cord. Monitoring the UCI is important because excessive coiling of the umbilical cord can potentially lead to complications during pregnancy and childbirth.<sup>4</sup> In cases of abnormal UCI, healthcare providers may conduct further evaluations to ensure the fetus is receiving an adequate blood supply and that the umbilical cord is not compressed or causing any issues.<sup>5</sup> An abnormal UCI includes both hypocoiled cords (i.e.; cords with UCI  $< 10$ th percentile) and hypercoiled cords (i.e.;

cords with UCI [90th percentile]). An abnormal UCI has been reported to be related to adverse perinatal outcome.<sup>6</sup> The present study was conducted to assess relation of umbilical coiling index & the perinatal outcome.

**MATERIALS & METHODS**

The present study consisted of 56 healthy women with term gestation. All gave their written consent to participate in the study.

Data such as name, age, etc. was recorded. Each woman's second and third stages of labor were observed. The umbilical cord was tied and cut as close to the placenta as possible after the baby was removed from it. The length of the entire umbilical cord, including the placental end and the baby's umbilical stump, was measured. From the neonatal end of the cord to the placental end, the number of complete coils or spirals was measured and expressed in centimeters. By dividing the total number of coils by the total cord length in centimeters, the UCI was calculated. Perinatal factors were recorded. Data thus obtained were subjected to statistical analysis. P value  $< 0.05$  was considered significant.

**RESULTS****Table I Meconium in relation to UCI**

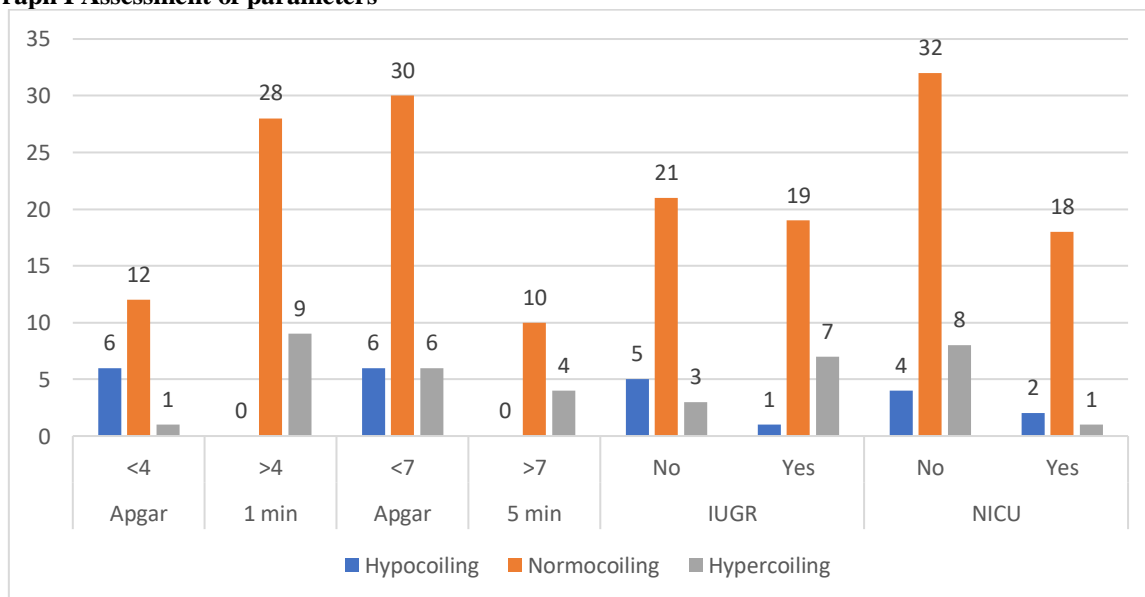
Meconiumstaining	Hypocoiling	Normocoiling	Hypercoiling	Total
Present	6	23	10	39
Absent	0	17	0	17
Total	6	40	10	56
P value	0.04			

Table I shows that meconium staining was present in all 6 cases of hypocoiling, 23 cases of normocoiling and 10 cases of hypercoiling. The difference was significant ( $P < 0.05$ ).

**Table II Assessment of parameters**

Parameters	Variables	Hypocoiling	Normocoiling	Hypercoiling	P value
Apgar 1 min	<4	6	12	1	0.02
	>4	0	28	9	
Apgar 5 min	<7	6	30	6	0.05
	>7	0	10	4	
IUGR	No	5	21	3	0.04
	Yes	1	19	7	
NICU	No	4	32	8	0.03
	Yes	2	18	1	

Table II, graph I shows that Apgar score at 1 minute <4 was seen in 6, 12 and 1 and >4 in 9, 28 and 9 in hypocoiling, normocoiling and hypercoiling cases respectively. Apgar score at 5 minutes <7 was seen in 6, 30 and 6 and >7 in 0, 10 and 4 cases of hypocoiling, normocoiling and hypercoiling respectively. IUGR was seen in 1, 19 and 7 and NICU admission in 2, 18 and 1 hypocoiling, normocoiling and hypercoiling cases respectively. The difference was significant ( $P < 0.05$ ).

**Graph I Assessment of parameters****DISCUSSION**

A high UCI may be associated with increased risks, such as decreased blood flow and oxygen delivery to the fetus, potentially leading to fetal distress.<sup>7</sup> Conversely, a low UCI may indicate a more straightforward pregnancy without excessive cord coiling.<sup>8,9</sup> It's essential to note that the interpretation of UCI values and their clinical significance may vary, and healthcare professionals consider multiple factors when evaluating fetal well-being and making decisions regarding pregnancy management and delivery.<sup>10,11</sup> The present study was conducted to

assess relation of umbilical coiling index & the perinatal outcome.

We found that meconium staining was present in all 6 cases of hypocoiling, 23 cases of normocoiling and 10 cases of hypercoiling. Devaru D et al<sup>12</sup> correlated the perinatal outcome by noting the umbilical coiling index. The umbilical cords of the babies born to 100 women, who delivered either vaginally or by lower segment cesarean section, were examined and umbilical coiling index was calculated. There was significant correlation between the hypercoiled cords (UCI[90th percentile]) and intrauterine growth

restriction of the babies. Apgar score at 1 min  $\leq 4$  and 5 min  $\leq 7$  was highly significant ( $p < 0.001$ ) with hypocoiled cords. Meconium staining was significantly ( $p$  value- 0.001) associated with the hypocoiled cords (UCI 10th percentile)

We found that Apgar score at 1 minute  $< 4$  was seen in 6, 12 and 1 and  $> 4$  in 9, 28 and 9 in hypocoiling, normocoiling and hypercoiling cases respectively. Apgar score at 5 minutes  $< 7$  was seen in 6, 30 and 6 and  $> 7$  in 0, 10 and 4 cases of hypocoiling, normocoiling and hypercoiling respectively. IUGR was seen in 1, 19 and 7 and NIUC admission in 2, 18 and 1 hypocoiling, normocoiling and hypercoiling cases respectively. Rana et al<sup>13</sup> evaluated perinatal outcome in neonates with hypocoiled and hypercoiled cords. The umbilical coiling index was calculated by dividing the total number of coils by the length of the cord. The subjects with hypocoiled cords differed from those with normocoiled cords in two significant ways: rates of fetal heart rate (FHR) disturbances and interventional delivery were higher in the hypocoiled group (28.6 versus 15.9% [ $P = .01$ ] and 19 versus 7.1% [ $P = .002$ ], respectively). The subjects with hypercoiled cords compared with those found to have normocoiled cords had a higher rate of premature delivery (33.3 versus 12.0% [ $P < .0001$ ]) and a higher incidence of cocaine use (12.7 versus 3.3%).

Machin et al<sup>14</sup> reported the frequency and clinical correlations of abnormally coiled cords among 1329 cases. Twenty-one percent of cords were overcoiled and 13% were undercoiled. Abnormal cord coiling was seen at all gestational ages. Principal clinical correlations found in overcoiled cords were fetal demise (37%), fetal intolerance to labor (14%), intrauterine growth retardation (10%), and chorioamnionitis (10%). For undercoiled cords, the frequencies of these adverse outcomes were 29%, 21%, 15%, and 29%, respectively. Abnormal cord coiling was associated with thrombosis of chorionic plate vessels, umbilical venous thrombosis, and cord stenosis. Thus, abnormal cord coiling is a chronic state, established in early gestation, that may have chronic (growth retardation) and acute (fetal intolerance to labor and fetal demise) effects on fetal well-being.

The limitation of the study is the small sample size.

## CONCLUSION

Authors found that UCI [90th percentile of the umbilical cord (hypercoiling) is associated with IUGR, and UCI 10th percentile of the cord (hypocoiling) is associated with low Apgar scores at 1 and 5 minutes, respectively, and meconium staining.

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