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Association of Maternal Anemia with Umbilical Cord Coiling

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ABSTRACT
Conflicting information exists regarding the relationship between maternal anemia and umbilical cord coiling. Some studies did not find a statistically significant link between maternal anemia and umbilical cord coiling, while others did find a correlation. An observational study was conducted in the Department of Obstetrics and Gynaecology at Gandhi Medical College and Sultania Zanana Hospital in Bhopal. The study was approved by the Institutional Ethics Committee and lasted for one year, from January 1, 2020, to December 31, 2020. Data was collected from 300 study subjects using a pre-designed semi-structured questionnaire and observation checklist. The current study aims to investigate any potential correlation between maternal anemia and umbilical cord coiling. There was a statistical significance between moderate anemia with or without medical problems and umbilical coiling more with normocoiled then hypocoiled followed by hypercoiled (P value = 0.003). There was a statistical significance between severe anemia with or without medical problems and umbilical coiling more with hypocoiled then normocoiled followed by hypercoiled (P value = 0.028). Statistically significant differences were found between mild anemia with or without medical issues and the degree of umbilical coiling, with normocoiled being more common than hypocoiled and hypercoiled. Only a small number of people had severe anemia or other medical issues. Statistically significant differences were found between severe anemia with or without medical conditions and the degree of umbilical coiling, with a higher prevalence of hypocoiling compared to normocoiling, followed by hypercoiling. Additional multicenter studies with larger sample sizes are suggested to confirm the results of the current investigation.

INTRODUCTION

The umbilical cord is a pliable, winding cord covered with a smooth amnion outer layer. It runs from the fetus's umbilicus to the center of the placenta. The length varies between 50 cm and 60 cm, with a diameter of approximately 1 cm[1].

The umbilical cord commonly exhibits various helical coiling patterns as a morphological difference. The extent of coiling is quantified using the umbilical cord index (UCI). The umbilical cord coiling pattern typically has a UCI of 0.2 coil/cm. The rope type is often regarded as the predominant style of umbilical cord coiling. Hyper-coiling of the umbilical cord is characterized by a UCI exceeding 0.3 coil/cm and occurs with around 6% to 21% of pregnancies[2].

The Umbilical Coiling Index (UCI) is calculated by dividing the total number of cord coils by the total length of the cord in centimeters[3].

Further, UCI (Umbilical cord index) has been grouped as follows: <10th percentile-hypocoiled; 10th-90th percentile-normocoiled; >90th percentile-hypercoiled[3].

Conflicting information exists regarding the relationship between maternal anemia and umbilical cord coiling. Some studies showed no statistically significant link between maternal anemia and umbilical cord coiling, while others found some association[4].

The current study aims to investigate any correlation between maternal anemia and umbilical cord coiling. Ministry of Health and Family Welfare Government of India Guidelines for controlling Iron deficiency anemia are being compared[5]. Moderate anemia is characterized by hemoglobin values ranging from 7.0 to 9.9 g dL^{-1}, while severe anemia is indicated by hemoglobin levels below 7.0 g dL^{-1} [6]

MATERIAL AND METHODS

An observational study was conducted in the Department of Obstetrics and Gynaecology at Gandhi Medical College and Sultania Zanana Hospital in Bhopal, after approval from the Institutional Ethics Committee.

A study was carried out over a one-year period from January 1, 2020, to December 31, 2020. It involved 300 study subjects identified through Open Epi open-source Software. The prevalence of umbilical cord coiling was assumed to be 12.55%[5], with a sample size calculated as 292 and rounded up to 300 for a 99% Confidence Interval (CI). The study utilized a pre-designed semi-structured questionnaire and observation checklist.

The results were coded correctly and data was gathered and organized using MS Excel. It was then tallied and displayed as percentages and proportions. Statistical methods such as the Chi Square test and Fisher's exact test were employed for data analysis.

RESULTS

The minimum age of the total 300 study subjects was 18 years and maximum age was 36 years; the minimum period of gestation is 37 weeks and maximum was 41 weeks (Table 1).

Of total 300 study subjects, most cases (n = 126) were normocoiled, followed by hypocoiled (Fig. 1).

Total 38 patients out of 300 cases had moderate anemia with or without any medical problem (these medical problems included Cardiac disorder, GDM (Gestational Diabetes mellitus), Hypothyroidism, Oligohydraminos, severe pre eclampsia, Gestational

Table 1: Age wise distribution of Subjects along with their Umbilical Coiling

Age group (years)	Umbilical Cord Coiling			
	Hypocoiled	Normocoiled	Hypercoiled	Total
18-22	35 (34.0%)	41 (32.0%)	26 (37.7%)	102 (34%)
23-27	45 (43.7%)	58 (45.3%)	32 (46.4%)	135 (45.0%)
28-32	20 (19.4%)	27 (21.1%)	9 (13.0%)	56 (18.7%)
33-37	3 (2.9%)	2 (1.6%)	2 (2.9%)	7 (2.3%)
Total	103 (100%)	128 (100%)	69 (100%)	300 (100%)

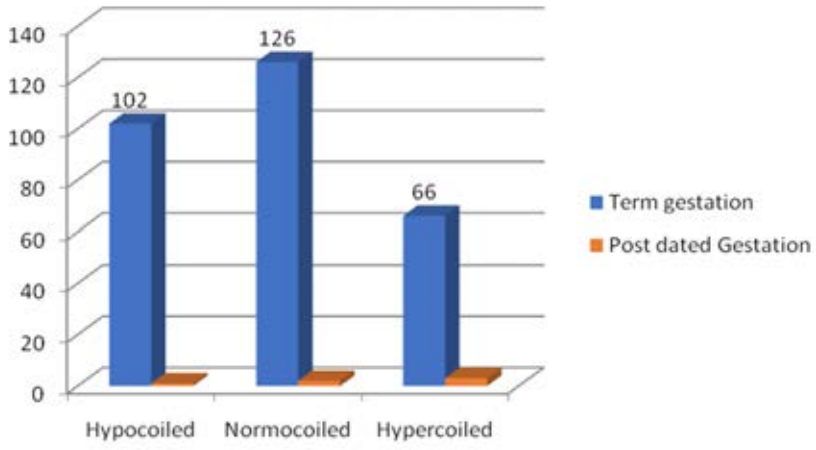

Fig. 1: Graph showing distribution of cases as per gestational age

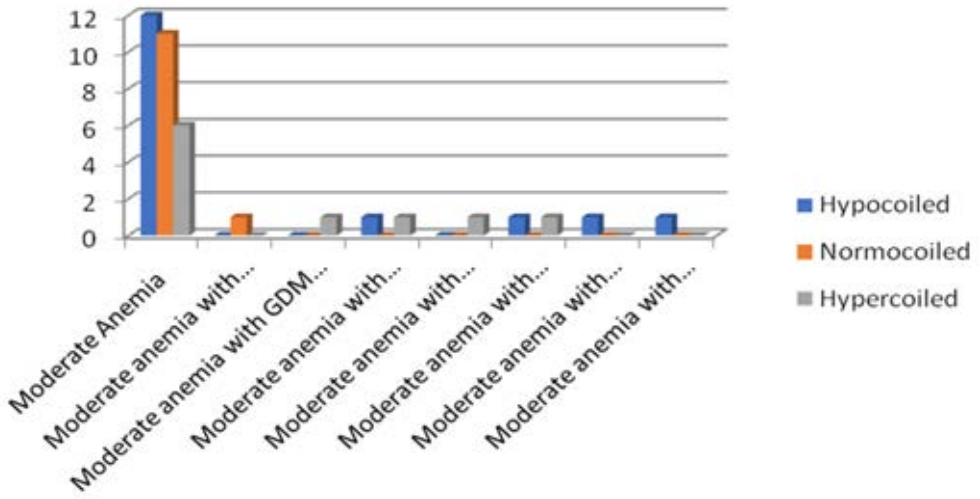

Fig. 2: Graph showing Correlation of Moderate anemia with and Umbilical Coiling (N = 38)

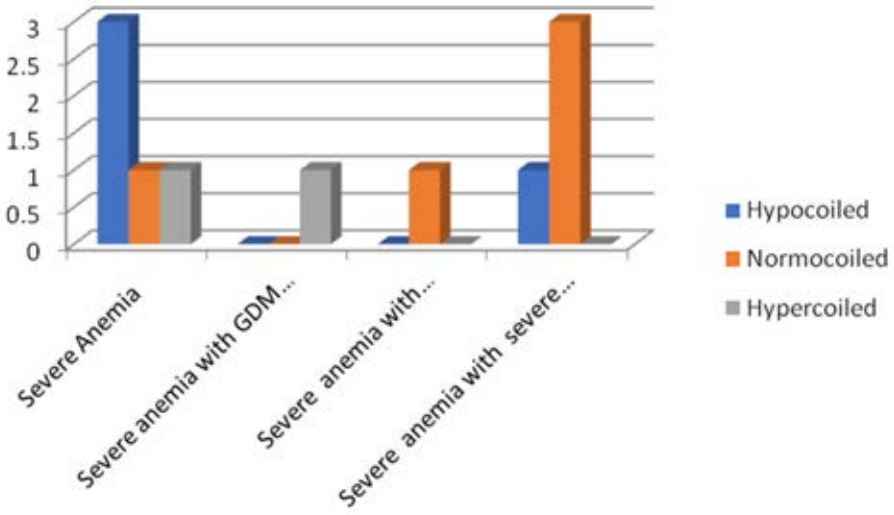

Fig. 3: Graph showing Correlation of Severe Anemia with Umbilical Coiling (N = 11)

Table 2: Correlation of Moderate Anemia with and Umbilical Coiling (N = 38)

	Umbilical Cord Coiling				
Moderate Anemia with or without medical conditions	Hypocoiled	Normocoiled	Hypercoiled	Total	p-value
Moderate Anemia	12 (75%)	11 (91.66%)	6 (60%)	29(76.31%)	0.003
Moderate anemia with Cardiac disorder	0 (0%)	1 (8.33%)	0 (0%)	1(2.63%)	
Moderate anemia with GDM (Gestational Diabetes mellitus)	0 (0%)	0 (0%)	1 (10%)	1(2.63%)	
Moderate anemia with Hypothyroidism	1 (6.25%)	0 (0%)	1 (10%)	2(5.26%)	
Moderate anemia with Oligohydraminos	0 (0%)	0 (0%)	1 (10%)	1(2.63%)	
Moderate anemia with severe pre eclampsia	1 (6.25%)	0 (0%)	1 (10%)	2(5.26%)	
Moderate anemia with Gestational hypertension	1 (6.25%)	0 (0%)	0 (0%)	1(2.63%)	
Moderate anemia with Gestational hypertension with Oligohydraminos	1 (6.25%)	0 (0%)	0 (0%)	1(2.63%)	
Total	16(100%)	12(100%)	10 (100%)	38 *(100%)	

hypertension and Gestational hypertension with Oligohydraminos. There was a statistical significance between moderate anemia with or without medical problems and umbilical coiling more with normocoiled then hypocoiled followed by hypercoiled (P value = 0.003) (Table 2).

Moderate anemia was found be associated with hypocoiled, normocoiled and hypercoiled cases respectively (Fig. 2).

Total 11 patients out of 300 study subjects were having severe anemia with or without GDM(Gestational Diabetes mellitus), severe pre eclampsia and polyhydraminos. There was a statistical significance between severe anemia with or without medical problems and umbilical coiling more with hypocoiled then normocoiled followed by hypercoiled (p value = 0.028) (Table 3).

Table 3: Correlation of Severe Anemia with Umbilical Coiling (N = 11)

	Umbilical Cord Coiling				
Severe Anemia with or without medical conditions	Hypocoiled	Normocoiled	Hypercoiled	Total	p-value
Severe Anemia	3 (75%)	1 (20%)	1 (50%)	5(45.45%)	0.028
Severe anemia with GDM (Gestational Diabetes mellitus)	0 (0%)	0 (0%)	1 (50%)	1(9.09%)	
Severe anemia with polyhydraminos	0 (0%)	1 (20%)	0 (10%)	1(9.09%)	
Severe anemia with severe pre eclampsia	1 (25%)	3 (60%)	0 (10%)	4 (36.36%)	
Total	4(100%)	5(100%)	2 (100%)	11* (100%)	

Severe anemia was found be associated with hypocoiled with more number of cases, followed by normocoiled and hypercoiled cases equally (Fig. 3).

DISCUSSION

The study was conducted in the Obstetrics and Gynaecology department of Gandhi Medical College and Sultania Zanana Hospital, Bhopal, after receiving approval from the Institutional Ethics Committee. It aimed to determine the accuracy of UCI (Umbilical Coiling Index) and its correlation with maternal anemia as a risk factor. The study took place from June 1, 2020, to June 1, 2021.

Pre-designed Semi-structured proformas were used to collect the baseline details. Out of 300 study subjects in the present study, 128 (42.6%) were normocoiled, 103 (34.33%) were hypocoiled and 69 (23%) were hypercoiled. Steinl *et al*.[5] have found that in unselected singleton pregnancies, data indicate that from 72.5% to 80.0% of umbilical cords are normocoiled, prevalence of hypocoiled cords in unselected singleton pregnancies ranges from 7.5% to 16.0% and prevalence of hypercoiling ranges from 6.7% to 20.0% in unselected singleton pregnancies[5].

Total 38 patients out of 300 study subjects were having moderate anemia with or without any medical problem (these medical problems included Cardiac disorder, GDM (Gestational Diabetes mellitus), Hypothyroidism, oligohydraminos, severe pre eclampsia, Gestational hypertension and Gestational hypertension with Oligohydraminos. Moderate Anemia was defined as Hemoglobin levels- 7.0-9.9 g dL^{-1}); There is a statistical significance between moderate anemia with or without medical problems and umbilical coiling (P value = 0.003).

Out of 300 trial subjects, 11 individuals had severe anemia together with GDM, severe pre-eclampsia and polyhydramnios. Severe anemia was characterized by hemoglobin levels below 7.0 g dL^{-1}. A statistically significant relationship was found between severe anemia with or without medical issues and umbilical coiling (P value=0.028). Several investigations have yielded inconsistent findings. Kalem *et al*.[4] discovered no statistically significant association between maternal Hb concentrations and the UCI. Other studies have not shown a statistically significant connection between umbilical cord coiling and anemia[7-10].

CONCLUSION

This study emphasizes the correlation between maternal anemia and umbilical cord coiling. Most study subjects in the current research were normocoiled, with fewer being hypocoiled and the remaining being hypercoiled. Approximately 10% of the trial participants had moderate anemia, with or without any underlying medical conditions. Statistically significant differences were found between mild anemia with or without medical issues and the degree of umbilical coiling, with normocoiled being more prevalent than hypocoiled and hypercoiled. Only a small number of people had severe anemia or other medical issues. Statistically significant differences were found between severe anemia with or without medical conditions and the degree of umbilical coiling, with hypocoiling being more common than normocoiling, followed by hypercoiling. Additional multicenter studies with a larger sample size are suggested to confirm the results of the current investigation.

REFERENCES

1. Fathi, A.H., H. Soltanian and A.A. Saber, 2012. Surgical anatomy and morphologic variations of umbilical structures. Am. Surg., 78: 540-544.
2. Kashanian, M., A. Akbarian and J. Kouhpayehzadeh, 2006. The umbilical coiling index and adverse perinatal outcome. Int. J. Gynaecol. Obstet., 95: 8-13.
3. Rana, J., G.A., Ebert and K.A. Kappy, 1995. Adverse perinatal outcome in patients with an abnormal umbilical coiling index. Obstet. Gynecol., 85: 573-577.
4. Kalem, M.N., Z. Kalem, N. Akgun, E. Yuce and H. Aktas, 2019. Investigation of possible maternal and fetal factors which affect umbilical coiling index. J. Maternal-Fetal Neonatal Med., 32: 954-960.
5. Steinl, G.K., J.S. Gandelman, P.J. Katzman, Y. Ru, R. Guillet, E. Pressman, E.M. Cooper and K.O. O'Brien, 2018. Umbilical cord coiling in high-risk pregnancies: associations with determinants of adverse birth outcomes and iron status. Pediatr. Dev. Pathology, 21: 537-547.

6. Bellad, A., R. Kapil and A. Gupta, 2018. National guidelines for prevention and control of iron deficiency anemia in India. Indian J. Community Health, 25: 89-94.
7. Chitra, T., Y.S. Sushanth and S. Raghavan, 2012. Umbilical coiling index as a marker of perinatal outcome: an analytical study. Obstet. Gynecol. Int., Vol. 14.
8. Khan, T. and D. Thakur, 2019. Association of postnatal umbilical coiling index with maternal and perinatal outcome. Int. J. Clin. Obstet. Gynaecol., 3: 144-149.
9. Najarajan, G., S.P. Sundaram and S. Radhakrishnan, 2016. Evaluation of umbilical cord coiling index in late second trimester and its association with perinatal outcome. Indian J. Obstet. Gynecol. Res., 3: 234e8.
10. Gaikwad, P. and K. Patole. Umbilical coiling index and perinatal outcome. MVP J. Med. Sci., 17: 118-121.