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ORIGINAL ARTICLE

Incidence of nuchal cord and its effect on mode of delivery and fetal outcome.

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ABSTRACT… Objective: To determine the frequency of nuchal cord in term pregnancies and to evaluate maternal outcomes (cesarean section or vaginal delivery) and neonatal outcomes (low birth weight, poor APGAR score, or intra-partum loss) in patients with nuchal cord. **Study Design:** Descriptive Cross-sectional study. **Setting:** Department of Obstetrics and Gynecology, Maternal Newborn & Child Healthcare Unit, Faisalabad. **Period:** June 2024 to November 2024. **Methods:** Sample size of 369 term pregnancies (36–40 weeks). Patients were selected using non-probability consecutive sampling. Demographic details, nuchal cord presence, delivery mode, and neonatal outcomes (low birth weight and APGAR scores) were recorded. Data analysis was performed using SPSS version 26, with stratification for effect modifiers such as age, gestational age, parity, and number of cord loops. A p-value ≤0.05 was considered significant. **Results:** The frequency of nuchal cord was 24.4%. Maternal outcomes were not significantly affected by nuchal cord presence, as 72.2% of cases with nuchal cord had vaginal deliveries (p=0.199). Neonatal outcomes showed no significant relationship with nuchal cord presence: Low birth weight (<2.5 kg): 11.1% (nuchal cord) vs. 8.6% (no nuchal cord) (p=0.474). Poor APGAR scores (<7): 41.1% (nuchal cord) vs. 38.4% (no nuchal cord) (p=0.641). The number of cord loops did not significantly impact delivery mode or neonatal outcomes. **Conclusion:** Nuchal cord was common in term pregnancies but was not associated with adverse maternal or neonatal outcomes. Routine detection of nuchal cord should not prompt unnecessary cesarean sections. Future research should focus on multiple nuchal cords and their long-term neonatal implications.

Key words: Nuchal Cord, Term Pregnancy, Cesarean Section, Vaginal Delivery, Low Birth Weight, APGAR Score.

INTRODUCTION

Nuchal cord refers to an umbilical cord that is wrapped entirely around the fetal neck.[1-2] The incidence of nuchal cords increases with gestation age and the incidence of a single nuchal cord in term singleton deliveries is reported to range between 20% and 35%.[3] The detection of nuchal cord seems random, but it occurs more frequently in fetuses with long umbilical cords, increases amount of amniotic fluid in the sac and excessive fetal movements.[4]

It is common to believe that the nuchal cord can strangle or suffocate the baby when it is wrapped around the neck of the baby, but in reality, the baby cannot breathe inside the uterus, so the mother must provide all the oxygen to the baby, as well as get rid of all the carbon dioxide for the baby, this gaseous exchange happen in placenta. The umbilical vessels of the umbilical cord are essential for the gas exchange while the fetus is inside the uterus. Whether the cord is wrapped around the neck, leg or shoulder the result will remain the same. Although there will not be any problems during pregnancy but the cord may become stretched or compressed during delivery, potentially leading to complications.[5]

Studies have demonstrated increased neonatal morbidity associated with nuchal cords, including reduced Apgar scores, meconium-stained amniotic fluid, and fetal distress.[6] It is also observed that rate of cesarean section is increased as an indication of non-reassuring fetal heart tracing caused by nuchal cord.[7] However, others did not find an increase in non-reassuring fetal heart rate patterns and reduced Apgar scores.[5]

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A study determined the frequency of the nuchal cord as 9.5% in term pregnancy and reported that 18% patients underwent caesarean section.[9] While another study reported low birth weight in 4% neonates, poor APGAR score in 8.4% neonates.[10]

The data on management of pregnancy with nuchal cord are scarce in literature. So, the aim of this study is be to find the frequency of nuchal cord and its effects on maternal and fetal outcome. The study will help to formulate guidelines for management of pregnancies with nuchal cord to reduce maternal and fetal complications.

METHODS

The study was conducted in the Department of Obstetrics and Gynecology at the Maternal Newborn & Child Healthcare unit in Faisalabad. A descriptive cross-sectional design was employed over six months after ethical approval. The sample size of 369 was calculated using the WHO sample size calculator with an anticipated proportion of 4%, absolute precision of 2%, and a 95% confidence level. Non-probability consecutive sampling was used for participant selection. Inclusion criteria comprised term pregnancies (36–40 weeks) with cephalic presentation, singleton pregnancy, and either spontaneous or induced labor. Exclusion criteria included patients with antepartum hemorrhage, repeat cesarean sections, other indications for cesarean delivery, diabetes mellitus, cardiac problems, gestational diabetes mellitus, severe pre-eclampsia and eclampsia, placenta previa, and abnormal fetal presentations such as breech or transverse lie.

Data were collected after approval from the hospital's ethical review committee (MNCH/Admn/22/792(1/10/22) and obtaining informed consent from patients. Demographic details, including age and gestational age, were recorded. All participants underwent ultrasonography, and the presence of a nuchal cord was diagnosed based on operational definitions. Patients were followed through labor, with the labor progress documented and mode of delivery decided based on fetal distress and labor progression. After delivery, neonatal weight and APGAR scores were recorded, and outcomes were noted in terms of low birth weight, poor APGAR scores, or intra-partum loss. Data were entered into a pre-designed proforma for analysis.

The data were analyzed using IBM-SPSS version 26. Frequencies and percentages were calculated for qualitative variables such as parity, mode of delivery, presence of a nuchal cord, low birth weight, and poor APGAR scores. Means and standard deviations were calculated for quantitative variables such as age, gestational age, number of cord loops, and APGAR scores. Effect modifiers, including age, gestational age, parity, and the number of cord loops around the neck present were controlled through stratification. Post-stratification chi-square testing was performed, with a p-value ≤ 0.05 considered statistically significant.

RESULTS

Table-I provides an overview of the demographic characteristics and clinical outcomes of the study population. The majority of patients were aged >30 years (54.2%), while 45.8% were in the 18–30 years age group. Regarding gestational age, 63.4% of patients delivered between 36–38 weeks, and 36.6% delivered at 39–40 weeks. Parity data showed that 79.7% of women had 1–3 pregnancies, while only 20.3% had more than three pregnancies.

In terms of clinical factors, 24.4% of deliveries were associated with a nuchal cord, while 75.6% had no nuchal cord involvement. For the number of loops around the neck, the majority had no loops (85.1%), whereas 8.1%, 4.3%, and 2.4% had 1, 2, and 3 loops, respectively.

Maternal outcomes indicated that 66.7% of patients underwent vaginal delivery, while 33.3% required cesarean section. Neonatal outcomes revealed that 9.2% of neonates had low birth weight (<2.5 kg), and 39% had a poor APGAR score (<7). The remaining 90.8% and 61% had normal birth weights and APGAR scores, respectively.

Table-II examines maternal outcomes (vaginal

delivery and cesarean section) across key variables. Maternal age had no significant effect on delivery mode (p=0.605), with vaginal delivery at 68.0% for women aged 18–30 years and 65.5% for women aged >30 years. Gestational age was also not significantly associated (p=0.819), as vaginal delivery rates were 67.1% for 36–38 weeks and 65.9% for 39–40 weeks. Parity showed no significant difference (p=0.410), although vaginal delivery was slightly more frequent in women with >3 pregnancies (70.7%) compared to 1-3 pregnancies (65.6%). Presence of a nuchal cord also did not significantly impact maternal outcomes (p=0.199), as 72.2% of women with a nuchal cord had vaginal deliveries compared to 64.9% without a nuchal cord. Similarly, the number of loops around the neck had no significant influence (p=0.816). Vaginal delivery rates were 66.9% with no loops, 70.0% with 1 loop, and 56.3% with 2 loops.

Maternal age showed a borderline significant relationship (p=0.050), as 12.4% of neonates from mothers aged 18-30 years had low birth weight compared to 6.5% in mothers aged >30 years. Gestational age did not significantly affect low birth weight (p=0.339), with rates of 8.1% and 11.1% for deliveries at 36-38 weeks and 39-40 weeks, respectively. Parity was also not significant (p=0.626), as 8.8% of neonates born to mothers with 1-3 pregnancies and 10.7% of those with >3 pregnancies had low birth weight. Nuchal cord presence did not impact low birth weight significantly (p=0.474), with rates of 8.6% and 11.1% for absence and presence of nuchal cord, respectively. Similarly, the number of loops around the neck showed no significant relationship (p=0.268), though 18.8% of neonates with 2 loops had low birth weight compared to 9.6% with no loops and 3.3% with 1 loop.

Table-IV explores the association between poor APGAR scores (<7) and effect modifiers. Maternal age showed no significant impact (p=0.386), as 41.4% of neonates from mothers aged 18–30 years and 37.0% from mothers aged >30 years had poor APGAR scores. Gestational age also lacked significance (p=0.239), with rates of 36.8% for 36-38 weeks and 43.0% for 39-40 weeks. Parity similarly showed no significant association (p=0.846), with poor APGAR scores recorded in 38.8% of neonates from mothers with 1-3 pregnancies and 40.0% for mothers with >3 pregnancies. Nuchal cord presence was not significantly related (p=0.641), although the rates were slightly higher at 41.1% for neonates with a nuchal cord compared to 38.4% without. The number of loops around the neck showed no significant relationship (p=0.203), though neonates with 1 loop had a higher rate of poor APGAR scores (56.7%) compared to those with no loops (37.3%) or 3 loops (33.3%).

Variable	Group	Count	Percent
Age (years)	18-30	169	45.8
	>30	200	54.2
Gestational Age (weeks)	36-38	234	63.4
	39-40	135	36.6
Parity	1-3	294	79.7
	>3	75	20.3
	Yes	90	24.4
	No	279	75.6
Number of Loops Around Neck	0	314	85.1
	1	30	8.1
	2	16	4.3
	3	9	2.4
Maternal Outcome	Vaginal Delivery	246	66.7
	Cesarean Section	123	33.3
Low Birth Weight (<2.5kg)	Yes	34	9.2
	No	335	90.8
Poor APGAR Score (<7)	Yes	144	39
	No	225	61

Table-I. Demographics and clinical outcome (maternal/neonatal) of the patients(n=369)

DISCUSSION

This study aimed to evaluate the frequency of nuchal cord in term pregnancies and its effects on maternal (cesarean section or vaginal delivery) and neonatal outcomes (low birth weight, poor APGAR score, and intra-partum loss). Our findings revealed a 24.4% prevalence of nuchal cord at term, which is consistent with previously reported rates by a study Leonhard Schäffer, ranging from 20% to 35% for term singleton deliveries.[11-12]

Variables		Maternal Outcome		Total	P-Value
		Vaginal Delivery	Cesarean Section		
Age (years)	18-30	115 (68.0%)	54 (32.0%)	169 (100.0%)	0.605
	>30	131 (65.5%)	69 (34.5%)	200 (100.0%)	
Gestational age (weeks)	36-38	157 (67.1%)	77 (32.9%)	234 (100.0%)	0.819
	39-40	89 (65.9%)	46 (34.1%)	135 (100.0%)	
Parity	1-3	193 (65.6%)	101 (34.4%)	294 (100.0%)	0.410
	>3	53 (70.7%)	22 (29.3%)	75 (100.0%)	
Nuchal cord	No	181 (64.9%)	98 (35.1%)	279 (100.0%)	0.199
	Yes	65 (72.2%)	25 (27.8%)	90 (100.0%)	
No. of loops around the neck	.00	210 (66.9%)	104 (33.1%)	314 (100.0%)	0.816
	1.00	21 (70.0%)	9 (30.0%)	30 (100.0%)	
	2.00	9 (56.3%)	7 (43.8%)	16 (100.0%)	
	3.00	6 (66.7%)	3 (33.3%)	9 (100.0%)	

Table-II. Frequency of maternal outcome according to various effect modifiers

Variables		Low Birth Weight		Total	P-Value
		No	Yes		
Age (years)	18-30	148 (87.6%)	21 (12.4%)	169 (100.0%)	0.050
	>30	187 (93.5%)	13 (6.5%)	200 (100.0%)	
Gestational age (weeks)	36-38	215 (91.9%)	19 (8.1%)	234 (100.0%)	0.339
	39-40	120 (88.9%)	15 (11.1%)	135 (100.0%)	
Parity	1-3	268 (91.2%)	26 (8.8%)	294 (100.0%)	0.626
	>3	67 (89.3%)	8 (10.7%)	75 (100.0%)	
Nuchal cord	No	255 (91.4%)	24 (8.6%)	279 (100.0%)	00474
	Yes	80 (88.9%)	10 (11.1%)	90 (100.0%)	
No. of loops around the neck	0	284 (90.4%)	30 (9.6%)	314 (100.0%)	0.268
	1.00	29 (96.7%)	1 (3.3%)	30 (100.0%)	
	2.00	13 (81.3%)	3 (18.8%)	16 (100.0%)	
	3.00	9 (100.0%)	0 (0.0%)	9 (100.0%)	

Table-III. Frequency of neonatal outcome (low birth weight) according to various effect modifiers

In our study, nuchal cord presence did not significantly influence the mode of delivery. Vaginal delivery was achieved in 72.2% of cases with nuchal cord compared to 64.9% in cases without (p=0.199). Similarly, there was no statistically significant association between the number of loops around the neck and delivery mode (p=0.816). These results align with findings by Zahoor et al[13] who reported no significant increase in cesarean section rates with nuchal cords. They noted that elective cesarean sections did not improve perinatal outcomes and were unjustified in cases of nuchal cord.

In contrast, previous data[11] reported higher rates of labor induction and slow labor progression associated with nuchal cords, but no significant increase in cesarean deliveries. Our results further emphasize that the presence of a nuchal cord alone should not dictate the mode of delivery, as most cases can safely achieve vaginal delivery.

The study explored neonatal outcomes, focusing on low birth weight and poor APGAR scores. The prevalence of low birth weight (<2.5 kg) was 9.2%, with no significant association to nuchal cord presence (p=0.474).

Variables		Poor APGAR Score		Total	P-Value
		No	Yes		
Age (years)	18-30	99 (58.6%)	70 (41.4%)	169 (100.0%)	0.386
	>30	126 (63.0%)	74 (37.0%)	200 (100.0%)	
Gestational age (weeks)	36-38	148 (63.2%)	86 (36.8%)	234 (100.0%)	0.239
	39-40	77 (57.0%)	58 (43.0%)	135 (100.0%)	
Parity	1-3	180 (61.2%)	114 (38.8%)	294 (100.0%)	0.846
	>3	45 (60.0%)	30 (40.0%)	75 (100.0%)	
Nuchal cord	No	172 (61.6%)	107 (38.4%)	279 (100.0%)	0.641
	Yes	53 (58.9%)	37 (41.1%)	90 (100.0%)	
No. of loops around the neck	0	197 (62.7%)	117 (37.3%)	314 (100.0%)	0.203
	1.00	13 (43.3%)	17 (56.7%)	30 (100.0%)	
	2.00	9 (56.3%)	7 (43.8%)	16 (100.0%)	
	3.00	6 (66.7%)	3 (33.3%)	9 (100.0%)	

Table-IV. Frequency of neonatal outcome (poor APGAR score) according to various effect modifiers

However, neonates with 2 loops around the neck exhibited higher rates of low birth weight (18.8%) compared to no loops (9.6%). This observation suggests a potential correlation between multiple nuchal cord loops and fetal growth restriction, as noted in studies by Sharif et al[14] where multiple cord problems increased fetal complications.

Poor APGAR scores (<7) were observed in 39% of neonates overall. While there was no significant relationship between nuchal cord and poor APGAR scores (p=0.641), neonates with 1 loop demonstrated higher rates of poor APGAR scores (56.7%) compared to no loops (37.3%). This aligns with results from Peesay et al[12] who noted a slight increase in perinatal morbidity, such as low APGAR scores, in cases with nuchal cords.

Contrastingly, Zahoor et al[13] observed significantly lower APGAR scores at 1 minute in neonates delivered vaginally with nuchal cords (p=0.008), though the difference resolved by 5 minutes. This transient impact highlights that while immediate neonatal distress may occur due to umbilical cord compression, most cases recover quickly with appropriate management.

Our study's findings support the argument that nuchal cords are not inherently associated with adverse maternal or neonatal outcomes. Routine ultrasonographic detection of nuchal cords often causes anxiety and may lead to unnecessary interventions, such as cesarean sections, which are not justified based on evidence.

Clinical guidelines should emphasize that nuchal cords, even with multiple loops, do not necessarily compromise fetal well-being or delivery outcomes. Studies[15], including ours, confirm that fetal distress and poor outcomes are more likely influenced by factors such as multiple nuchal cords, reduced amniotic fluid, or prolonged labor, rather than the presence of a single loop alone. Early identification of true high-risk cases, such as those with multiple loops or associated abnormalities, may help guide appropriate interventions while avoiding unnecessary cesarean deliveries.

A strength of this study is its large sample size (n=369) and comprehensive evaluation of maternal and neonatal outcomes. However, limitations include the single-center design and exclusion of preterm deliveries, which may limit the generalizability of findings to broader populations. Additionally, long-term neonatal outcomes were not assessed.

CONCLUSION

The prevalence of nuchal cord in term pregnancies is substantial but does not significantly impact maternal or neonatal outcomes. Vaginal delivery remains a safe option in most cases, and

the presence of a nuchal cord should not be considered an absolute indication for cesarean section.

LIMITATIONS

This study has several limitations. First, its cross-sectional design restricts the ability to establish causality between nuchal cord presence and neonatal outcomes. Second, the study was conducted at a single tertiary care hospital, limiting the generalizability of findings to other settings with different population characteristics and obstetric practices. Third, despite controlling for effect modifiers, residual confounding variables such as intrapartum fetal monitoring and maternal nutritional status were not accounted for. Additionally, the sample size, though statistically adequate, may not fully capture rare obstetric complications. Lastly, the reliance on ultrasonography for nuchal cord diagnosis may have led to misclassification errors, impacting the accuracy of associations observed.

RECOMMENDATIONS

Based on the findings, routine ultrasonographic assessment for nuchal cord presence should be considered in late gestation, but it should not dictate the mode of delivery unless additional risk factors for fetal distress are present. Labor management should focus on individualized decision-making rather than assuming adverse outcomes based on nuchal cord detection alone. Future prospective studies with larger, multicenter samples are recommended to validate these findings and explore long-term neonatal outcomes. Additionally, improved intrapartum monitoring protocols should be implemented to detect fetal distress in real time, ensuring timely intervention for better neonatal outcomes.

CONFLICT OF INTEREST

The authors declare no conflict of interest.

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1	**Sana Tariq:** Data collection, analysis, paper writing.
2	**Sana Riffat:** Data collection, paper writing.
3	**Samar Amin:** Discussion writing, review manuscript.
4	**Sanober Faisal:** Review of manuscript.
5	**Hafiz Ali Raza:** Data entry, literature review.
6	**Ayesha Tariq:** Data entry, literature review.
7	**Muhammad Ahsan:** Data analysis, manuscript writing