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# Effect of Nuchal Cord on Duration of Labor

**Saima Najam[11], Sumayya Ejaz Malik[2], Shehla Aqeel[3], Nida Rizwan[4], Ali Raza Haider[5]**

[1]FCPS(Pak), PG Cert Med (Dundee), Consultant Obgyn , Sweidi Exit 26, Hamza Bin Abdulmutalib Street Dr. Sulaiman Al Habib Hospital, Po box 5612, Riyadh 12944, Kingdom of Saudi Arabia
[2]Soecialist Obgyn, Dr. Sulaiman Al-Habib Hospital, Sweidi, Riyadh
[3]Assistant Professor, Fatima Memorial Hospital, Lahore, Pakistan
[4]Medical Officer, Combined Military Hospital, Lahore, Pakistan
[5]Managing Partner of DVM Pharma, Lahore, Pakistan

Corresponding Author: Saima Najam

## ABSTRACT

**Background:** Nuchal cord is the condition in which the umbilical cord is wound around the neck of the fetus. The presence of the nuchal cord is a random or chance event and usually associated with the long cord. Its association with the fetal distress is well recognized. However, little work has been published to analyse its effects on labour itself.
**Objective:** The objective of the study is to prove the null hypothesis that the nuchal cord is not associated with the increase in the duration of the labour.
**Material and Methods:** We have done a retrospective observational study to compare the effect of the nuchal cord on duration of labour in a study group with the control group which has no nuchal cord for a period of 6 months (first July 2019 -31 December 2019) in labor ward of Dr. Sulaiman Al-Habib Hospital, Sweidi, Riyadh, Saudi Arabia.
**Results:** We concluded on the basis of our observations that the duration of active phase of first stage, second and the third stage of the labour was not affected by the nuchal cord, secondly the difference in weight of the babies in both the groups was also found statistically in significant. We observed that the nuchal cord is more common in male babies but the difference was not found statistically significant.
The only postpartum complication was postpartum hemorrhage (PPH) which was found in two patients who belonged to the nuchal cord group.
**Conclusion:** We hereby conclude on the basis of our observations that the nuchal cord itself is not associated with the prolonged labour and it does not affect the weight of the baby. In addition we found no significant gender dominance in the nuchal cord group. It was established that the nuchal cord is not a risk factor for the postpartum hemorrhage.

***Key words:*** Pregnancy, labour, nuchal cord, neonate, birth weight, postpartum hemorrhage

## INTRODUCTION

Nuchal cord is the condition in which the umbilical cord is wound around the neck of the fetus. The presence of the nuchal cord is a random or chance event and usually associated with the long cord. [(1)] Its association with the fetal distress is well recognized. However, little work has been published to analyze its effects on labour itself. [(2)] We have done a retrospective observational study to compare the effect of the nuchal cord on duration of labour in a study group with the control group which has no nuchal cord. As it is difficult to calculate the duration of the first stage of labour so we have calculated the duration of the active phase of the first stage along with the second stage and third stage of labours. For the sake of our study we are calculating the active phase after patient is 5cm dilated till the full cervical dilatation. [(3)] Whenever the second stage of the labour is prolonged

the risk of postpartum hemorrhage (PPH) increases so we have included it in our secondary outcome. [4] For the aim of the study we delimited the nuchal cord as loose if the cord that can be reduced during delivery by sliding the loop over the head or the body of the baby. In contrast, nuchal cord loops were considered tight if it must be clamped and cut to allow delivery. [5,6]

The Purpose of Carrying Out This Research:

The purpose of the study was to prove the null hypothesis that the nuchal cord is not associated with the increase in the duration of the labour.

## MATERIAL AND METHODS

We have done a retrospective observational study to compare the effect of the nuchal cord on duration of labour in a study group with the control group which has no nuchal cord for a period of 6 months (first July 2019 till 31st December 2019) in labour ward of Dr. Sulaiman Al-Habib Hospital, Riyadh, Saudi Arabia. Our hospital is a 350 bedded multidisciplinary hospital. The study was conducted after getting the ethical approval from our Institutional Research Board (IRB).

We collected the data with the help of the predesigned proforma, which carried information about the age, gestational age of the patients, duration of each stage of labour, postpartum complications, weight and gender of the baby in addition to the information about the presence or absence of the cord. We took data retrospectively and once we had the selected number of patients with the nuchal cord, we calculated the total number of patients seen. The total numbers of patients seen were 1249. To form a control group we took every 12th patient without the nuchal cord for the control group, if that patient did not meet the inclusion criteria then we have taken the next patient in the list. After forming the control group, we compared the primary and secondary outcomes in both the groups. Our primary outcomes were the length of the first (active phase), second and third stage of labour and the weight of the baby. The secondary outcomes selected were postpartum complications and gender prevalence in the nuchal cord group. The Inclusion Criteria included all the record of the primiparous women having term, singleton pregnancy with cephalic presentation and spontaneous onset of labour. We excluded the patients who had the tight loop of the cord, had epidural analgesia, had any medical disorders or had elective caesarean section. Hence all the low risk pregnant patients meeting our inclusion and exclusion criteria were included in the study.

**Data collection method:**

The data was collected with the help of the predesigned proforma. We took the data retrospectively, once the required study population that is 100 patients with the nuchal cord was enrolled we calculated the number of patients seen and then we have taken every 12th patient without the nuchal cord to form a control group and then compared primary and secondary outcomes in both the groups.

**Data analysis method:**

Once the information of required number of the patients was collected then the data was entered in the Statistical Package for the Social Sciences Program (SPSS) program version 26 for the analysis and the primary and secondary outcomes were compared between both the groups .For all the quantitative data, Student t test was applied and chi square test was applied for the qualitative data respectively. The desired confidence interval was 95% with 10% margin of error. For all the tests P value of 0.05 and less was taken as statistically significant.

## RESULTS AND DISCUSSION

We studied total 200 patients, out of which 100 patients had the loose cord and another 100 were taken as a control and were without nuchal cord. When the demographics were compared the age of the patient was almost the same in both the groups. The mean age in the nuchal cord

and the control group was 24 years and 26 years respectively.

The difference of the active phase of first stage of labour was found statistically insignificant between both the groups as the p value which was calculated after applying Independent Sample T- test was 0.088. As shown in Table I.

**Table 1: COMPARISON OF DURATION OF FIRST STAGE OF LABOR**

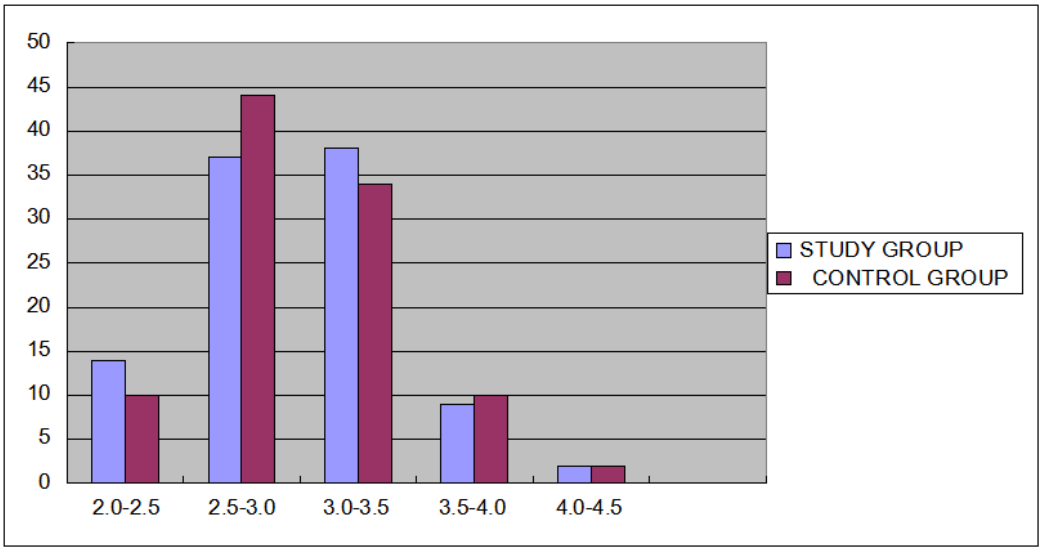
| LENGTH OF FIRST STAGE IN HOURS | STUDY GROUP (n=100) | CONTROL GROUP (n=100) | TOTAL (n=200) |
|---|---|---|---|
| 01-04 | 78%(n=78) | 63%(n=63) | 141 |
| 4.1-08 | 22%(n=22) | 37(n=37) | 59 |
| | 100%(n=100) | 100%(n=100) | 200 |

The comparison of both the groups in regard of the duration of the second stage is shown in table 2. The findings suggested that the nuchal cord had no significant effect on the duration of the second stage of labour as the P value is found insignificant. (p value = 0.637). The p-value is calculated after applying the T Test.

**Table 2: COMPARISON OF DURATION OF SECOND STAGE OF LABOR**

| LENGTH OF SECOND STAGE IN MINUTES | STUDY GROUP (n=100) | CONTROL GROUP (n=100) | TOTAL ( n=200) |
|---|---|---|---|
| 01-30 | 66%(n=66) | 70%(n= 70) | 136 |
| 30.1-60 | 28%(n=28) | 24%(n=24) | 52 |
| 60.1-90 | 06%(n=06) | 06%(n=06) | 12 |
| | 100%(n=100) | 100%(n=100) | 200 |

When the comparison was done for the third stage of labour it was found that 94 % of the patients (n=94) in the study group and 98% (n=98) of the patients in the control group had delivered placenta in less than 5 minutes. Though 6% of the patients with the nuchal cord had duration of the third stage from 5.1-10 minutes in comparison to 02% patients in the control group, but the p- value when calculated after applying the T- test was 0.587 which showed that the difference is statistically insignificant.

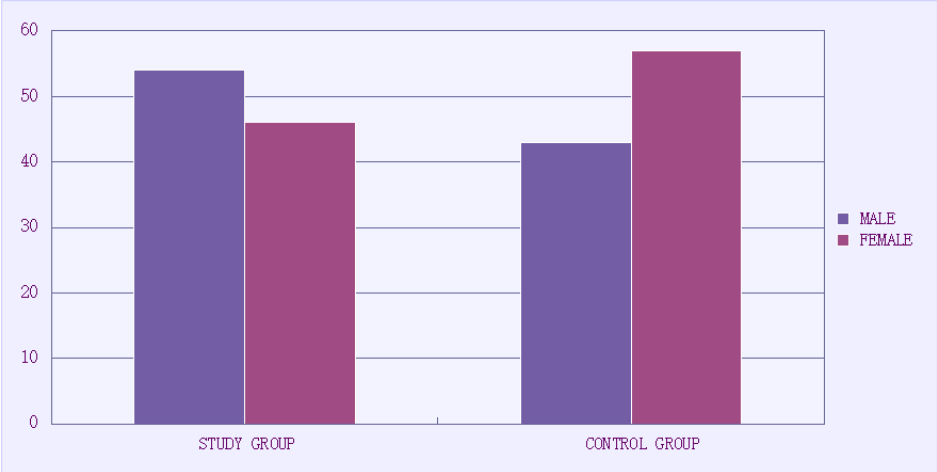



**Graph 1: Neonatal birth weight comparison**

Majority of the babies (38%, n=38) in the study population had weight between 3.0-3.5kg, while on the other hand only 34% (n= 34) of the control population share the same weight range. The majority population of the control group 44% (n=44) had weight between 2.5 to 3.0kg.The insignificant difference (as the p- value is 0.910 after applying the t-test) of the neonatal birth weight is depicted in graph 1,as shown above, which elaborates that the nuchal cord does not seem to effect the growth of the

baby as the mean birth weight in both the groups is not significantly different as well.

It was observed in our study that the nuchal cord was more common in male babies as shown in graph 2, 54% (n=54)of the babies who had nuchal cord were males as compared to 43% (n=43) in the control group but the difference was not found statistically significant. (P value is 0.102, after applying the chi-square test). Hence no significant gender predominance was seen.




**Graph 2: Gender distribution in both the groups**

We recorded the postpartum complications in both the groups and found no significant postpartum complication. We found that only 2% (n=2) of the patients in the nuchal cord group had the postpartum hemorrhage while it was not seen in the control group. The P-value of 0.155 shows its insignificance, when chi-square test was applied.

We observed that there is in direct relationship with increasing number of loops of cord and duration of labour. As shown in Table 3, more than two number of loops are associated with the reduced duration of labour. We had 27%(n=27) of the patients with two or more loops of cord and out of this 70%(n=19) of the patients had the second stage duration of less than 30minutes.On the basis of the results we concluded that the more the number of loops the lesser will be the duration of labour. When it is compared to the control group no significant difference was found as shown in table 3.

**Table 3: EFFECT OF NUMBER OF LOOPS ON DURATION OF SECOND STAGE**

| LENGTH OF SECOND STAGE IN MINUTES | SINGLE LOOP | DOUBLE LOOP | THREE LOOPS | FOUR LOOPS | CONTROL GROUP (n=100) | TOTAL (n=200) |
|---|---|---|---|---|---|---|
| 01-30 | 64%(n=47) | 63%(n=14) | 100%(n=4) | 100%(n=1) | 70% (n= 70) | n=136 |
| 30.1-60 | 30%(n=22) | 27%(n=06) | 000%(n=0) | 000%(n=0) | 24%(n=24) | n=52 |
| 60.1-90 | 1.3%(n=04) | 9.9%(n=02) | 000%(n=0) | 000%(n=0) | 06%(n=06) | n=12 |
| | (n=73) | (n= 22) | (n=04) | (n=01) | (n=100) | n=200 |

## DISCUSSION

We calculated and compared the duration of active phase of first, second and third stage of labour and found that the nuchal cord does not affect the duration of labour. Our observations were supported by Schaffer et al as they concluded that the nuchal cord does not affect the duration of labour. [(7)] Similar results were found by Ghi et al, [(8)] who concluded that the presence of the nuchal cord does not appear to be a factor affecting the labour duration. Karunanidhi [(9)] also detected that the duration of the active stage of the labour was not affected in the nuchal cord group and the same finding was found in our study.

The work of Imai K, in Japan strongly supports our findings as he established that the patients with the nuchal

cord does not have the increased incidence of the prolonged labour when compared to the control group without nuchal cord. [(10)]

Ogueh et al [(11)] in a Canadian population found that there was no effect of nuchal cord on the first stage of labour, however the duration of second stage was longer in the study group with nuchal cord as compared to the control group without the nuchal cord but we found no difference in both the active stage and the second stage duration of labour.

In contrast to our observations, Bahulkar in 2015 detected that the nuchal cord can delay the progress of labour and he suggested that it is due to the traction on the cord. [(12)] In another study done in Al-Elwiya Maternity teaching Hospital, Iraq in 2018, it was found contrary to our observations that the prolonged first and second stage of labour is the most frequent finding in the patients with the nuchal cord when compared to the control group, without the nuchal cord. [(13)] Narang et al reported same observations in their study in 2014. [(14)]

We detected that the nuchal cord does not affect the descent of the fetal head and there for does not prolong the second stage of labour as found by LaMonica. [(15)] Sangwan V et al, found that the duration of labour was effected by the number of the loops, he concluded that the duration of labour was prolonged in patients having two or more loops of the cord. [(16)] This is in contrast to our results as we found that the increasing number of loops of cord is associated with reduction in the duration of the second stage of the labour.

Tagliaferri S et al, in Italy in their study concluded that the patients with one or more than one loop of nuchal cord are associated with prolonged second stage of labour when compared with the group of the patients without the nuchal cord. [(17)] This is also in contrast to our finding as we found no difference when the duration of the second stage was compared between the control group and the patients with two or more loops of the cord.

Imai K [(10)] and Narang [(14)] found that the mean birth weight in patients with the nuchal cord group was low, this is in contrary to our observations as we detected no significant reduction in the neonatal birth weight.

We found that the nuchal cord was not found significantly prevalent in male fetuses, this is in disagreement with the prior findings of Wang et al, [(18)] in Japan who inferred that the nuchal cord prevalence is higher in the male fetuses and the same observations were shared by the Qin Y et al [(19)] in another study.

## CONCLUSION

We hereby conclude on the basis of our observations that the nuchal cord itself is not associated with the prolonged labor and it does not affect the weight of the baby. In addition we found no significant gender dominance in the nuchal cord group. It was established that the nuchal cord is not a risk factor for the postpartum hemorrhage.

**Limitations:**

We have selected the primigravidae having loose nuchal cord so further studies are needed to see the relationship of the tight loops of nuchal cord with the duration of labour. We did not find any postpartum complications as we have selected the low risk patients. Secondly 73% of our patients had single loop of cord so effect of multiple loops in larger population should be determined. This is the fruit of thought for all the future studies to determine the relationship of the nuchal cord with the duration of labour.

**Author's contribution:**

NS: Concept and design of the study, acquisition and analysis of data, drafting the manuscript, final approval of the manuscript.
MS: Data collection and drafting the manuscript.
AS: Revising the manuscript for intellectual content.
RN: Analysis and interpretation of data.
RA: Analysis and interpretation of data.

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**Conflict of Interest:** None to declare.

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