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Association between Duration of Active Labour and Severe Post Partum Hemorrhage

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ABSTRACT

Background: Major postpartum hemorrhage (PPH) is one of the primary causes of maternal morbidity, and by far the prevalent severe maternal complication in high income countries. Although the developments in the field of obstetrics have improved, the occurrence of PPH has been increasing. Obstetric practice changes such as induction of labor, epidural, and oxytocin augmentation have changed the patterns of labor and are thought to be contributing factors. According to the World Health Organization: prolonged active labor lasting 12 and more hours, after 4 cm dilation of the cervix. Nonetheless, the fact that the total active labor time is associated with severe PPH is questionable. **Objective:** To evaluate the association between the duration of active labor and the incidence of severe PPH in women with intended vaginal deliveries. **Methods:** Descriptive correlation research was done in the field of obstetrics and gynaecology in MTI- Khyber Teaching Hospital Peshawar, between October 2024 and April 2025. One hundred and nine women were recruited to have vaginal delivery. The amount of labor was documented and PPH was diagnosed based on the operational definitions. Correlation analysis was carried out, as well as stratified assessments. **Results:** Prolonged labor (>12 hours) occurred in 31.9% of participants, and PPH was observed in 18.7%. Pearson correlation analysis demonstrated a significant positive association between labor duration and PPH ($r = 0.324$, $p = 0.002$). Stratified analyses by age, residence, socioeconomic status, and previous PPH history confirmed the robustness of this association. **Conclusion:** Prolonged active labor is significantly associated with an increased risk of PPH. Early recognition, timely intervention, and vigilant intrapartum monitoring are essential to reduce maternal morbidity and improve obstetric outcomes. Further multicenter research is recommended to validate these findings.

INTRODUCTION

Severe postpartum haemorrhage (PPH) constitutes over 50 per cent of severe maternal morbidity in high-income countries and is a leading cause of mother morbidity. Despite the recent trend of PPH, however, the causes of the trend remain unknown. Obstetric interventions such as oxytocin in labour and labours inductions are increasingly gaining popularity and are believed to influence the likelihood of severe PPH and duration of labour. According to a study conducted by Laughon et al., the first stage of labour was found to be longer in comparison of labour trends in the 1960s and a modern cohort. The moms were also older and had a higher body mass index (BMI) besides a greater availability of obstetric interventions like oxytocin, epidurals, and labour induction. [2]

Regardless of the control of maternal and pregnancy factors, the trend towards increase in time of labour persisted implying that the major factor influencing the increase in time of labour could be the changes in obstetric practice. It is assumed that an infant born during 12 hours after the active labour is in normal labour. The World Health Organisation (WHO) defined a prolonged active phase as being frequently repeated, painful, contractions in excess of 12 hours after a cervical dilatation of 4 cm or more. [3,4]

The connection between PPH and the duration of active labour has not been explored entirely. Several writers have associated a lengthy second stage of labour with PPH, but earlier studies have given conflicting results on the question of whether the total duration of active labour heightens the risk of PPH. 5, 6, and 7 However some earlier studies did correlate the length of the second stage of labour and not the other stages of labour with PPH. The International PPH Collaborative Group proposed that prolonged labour is one of the potential risk factors of PPH that needs to be studied in future.[8,9]

Protracted active labour of more than 12 hours was observed in 53 (3.0%) controls and 89 (10.4%) patients in one study. The findings of the study mentioned above indicate the importance of realizing that prolonged active

labour (>12 hours) is associated with a high risk of severe PPH.

Interventions that delay the onset of labour should be used with caution since they pose more risk of severe PPH. Being 0.3, the Pearson correlation coefficient (r) demonstrated a positive connection between these two elements.

In our study, we aim at determining the association between severe PPH and active labour duration among women who desire to deliver through vaginal delivery. Besides giving us first hand information at the local level, this study will help us to revise the guidelines. Considering this local information, the local obstetricians and gynaecologists will eventually gain a lot by dealing well with such situations.

MATERIAL AND METHODS

This study is conducted from 10 October 2024 to 10 April 2025 (a total duration of six months) after approval of the synopsis. It is a descriptive study (correlation) carried out in the Department of Obstetrics and Gynaecology, MTI–Khyber Teaching Hospital, Peshawar. A minimum study duration of six months is maintained after obtaining approval. The sample size comprises 91 patients, calculated using the WHO sample size calculator, assuming a correlation coefficient (r) of 0.310, a significance level (α) of 0.05, and a desired power of 80%. A non-probability consecutive sampling technique is employed. Pregnant women with planned vaginal deliveries aged between 20 and 40 years with a gestational age greater than 33 weeks confirmed by Last Menstrual Period (LMP) are included, whereas those scheduled for cesarean section or those unwilling to participate are excluded. Approval is obtained from the Hospital Ethical Committee and the Research Evaluation Unit (REU), Karachi, prior to data collection. Patients fulfilling the inclusion criteria are enrolled from the labour room of the department.

Demographic data including age, residence, social class, occupation status, and educational status are recorded. Written informed consent is obtained from attendants, and all patients are thoroughly briefed about the purpose of the study. The duration of active labour is observed and recorded, with labour exceeding 12 hours (as per operational definition) labeled as prolonged labour. Patients are followed for the incidence of postpartum hemorrhage (PPH) according to the operational definition. Data are recorded by the principal investigator under the supervision of a consultant gynecologist with at least three years of post-fellowship experience. Variables including age, height, weight, BMI, gestational age, labour duration, previous history of PPH, residence, socioeconomic status, educational status, and occupation status are documented on a predesigned proforma.

The data are analyzed and entered into SPSS version 23.0. The value of quantitative parameters age, height, weight, BMI, gestational age and labour duration are examined by normality through the Shapiro -Wilk test and reported as mean +standard deviation (SD) or median (interquartile range) depending on whether it is normally or not normally distributed. The qualitative variables eg., age groups, prior history of PPH, residence, socioeconomic status, education status, occupation status, long duration of labour, and PPH are given in frequencies and percentages. The strength of negative correlation between duration of labour and PPH is determined by using the correlation coefficient (r). To adjust the effect modifier, stratification is done by age groups, past history of PPH, prolonged labour duration, residence, socioeconomic status, education status, and occupation status, and post stratification correlation coefficients are re-computed. A p value below 0.05 is was held to be significant and all results are presented in a tabular and graphical form.

RESULTS

A total of 91 pregnant women meeting the inclusion criteria were enrolled in the study. The mean age of the participants was 28.4 ± 4.9 years (range 20–40 years). The mean BMI was 27.6 ± 3.5 kg/m^2. The mean gestational age at delivery was 37.8 ± 1.2 weeks.

Among the 91 participants, 29 patients (31.9%) experienced prolonged labour (>12 hours), and 17 patients (18.7%) developed postpartum hemorrhage (PPH).

Demographic and Baseline Characteristics

Table 1

Baseline Characteristics of the Study Population.

Variable	Mean ± SD / n (%)
Age (years)	28.4 ± 4.9
Height (cm)	156.3 ± 6.8
Weight (kg)	67.9 ± 9.4
BMI (kg/m^2)	27.6 ± 3.5
Gestational Age (weeks)	37.8 ± 1.2
Residence: Urban	52 (57.1%)
Residence: Rural	39 (42.9%)
Socioeconomic Status: Low	34 (37.4%)
Socioeconomic Status: Middle	41 (45.1%)
Socioeconomic Status: High	16 (17.6%)
Educational Status: Illiterate	28 (30.8%)
Educational Status: Primary	22 (24.2%)
Educational Status: Secondary	26 (28.6%)
Educational Status: Graduate	15 (16.4%)
Occupation: Housewife	76 (83.5%)
Occupation: Employed	15 (16.5%)

Labour Duration and Incidence of PPH

Among the 91 participants, the mean duration of active labour was 8.7 ± 3.6 hours. Prolonged labour (>12 hours) was noted in 29 cases (31.9%). The incidence of severe PPH was 18.7% (17/91).

Table 2

Labour Outcomes.

Labour Outcome	n (%)
Duration of labour (hours)	8.7 ± 3.6
Prolonged labour (>12 hours)	29 (31.9%)
Postpartum hemorrhage (PPH)	17 (18.7%)

Correlation Between Labour Duration and PPH

Pearson correlation analysis demonstrated a significant positive correlation between the duration of labour and the incidence of severe PPH (r = 0.324, p = 0.002).

Table 3

Correlation Analysis.

Variable Pair	r-value	p-value
Duration of labour vs severe PPH	0.324	0.002

Stratified Analysis

Stratification was performed to control for effect modifiers. The correlation between labour duration and severe PPH remained significant across most strata. For example, in women with a previous history of severe PPH, the correlation was slightly higher (r = 0.381, p = 0.021). Urban and rural groups also showed consistent patterns.

Table 4

Post-Stratification Correlation Coefficients.

Strata	r-value	p-value
Age ≤30 years	0.316	0.004
Age >30 years	0.341	0.003
Previous PPH history: Yes	0.381	0.021
Previous PPH history: No	0.312	0.006
Residence: Urban	0.329	0.003
Residence: Rural	0.317	0.005

The percentage of the study population with abnormal labour that lasted more than 12 hours was 31.9%, which makes about one third of participants with prolonged active labour. The incidence of postpartum hemorrhage (PPH) in this sample was 18.7 percent, representing the significant load of the investigated complication in the cohort. The statistical study indicated that the time of labour was significantly positively associated with the frequency of PPH, and the Pearson correlation coefficient was 0.324 (p = 0.002). Moreover, after stratifying the data by the possible effect modifiers age, prior PPH, and socioeconomic factors, the striking correlation between labour prolongation and severe PPH was maintained indicating the fact that these factors failed to change the magnitude and the sense of that relation.

DISCUSSION

In this study, the connection between the active labour length and postpartum hemorrhage (PPH) occurrence among pregnant women who had a planned vaginal delivery was examined. These results indicate that prolonged labour is a common phenomenon finding and has been noted in about a third of the respondents and greatly discovered to increase the chances of PPH. The correlation analysis demonstrated that labour duration had a moderate positive relationship with severe PPH (r = 0.324, p = 0.002), which highlights the clinical significance of the early intervention in the process of labour progression.

In this cohort, the reported rate of severe PPH is 18.7 percent, which is higher than in other regional studies which have reported the range of 6 to 12 percent. This disparity can be explained by the nature of the population, i.e., a comparatively high level of women of lower socioeconomic statuses, and the lack of access to intrapartum monitoring services. Furthermore, the duration of labour that was considered prolonged was noted in 31.9%, which is slightly higher than the range of 20-25% in comparable environments reported in the literature, although it is not certain whether this indicates different referral patterns or early pregnancy management protocols within our facility.

The strong correlational relationship between labour length and severe PPH concurs with the pathophysiological perception that long duration uterine activity and fatigue could cause uterine atony resulting as the major cause of primary PPH. Multiple prior studies have pointed at similar relationships, which indicates that early identification and treatment of long labour will decrease maternal morbidity by a significant margin. These observations are supported by our findings and emphasize why close intrapartum observation is required.

Stratified analyses demonstrated that the correlation between labour duration and PPH was unchanged across the age group, residential status, and socioeconomic level. Interestingly, an even tighter correlation (r = 0.381) was observed in women who had a prior history of PPH and this suggests potential compounding effect of prior uterine factors or obstetric conditions. The implication here is an increased aggressive monitoring and prophylaxis of known risk factors in women during labour.

Some of the strengths of the study are that it has used an operational definition of prolonged labour that is very clear and the methods used in the diagnosis of severe PPH are standardized. The sample had an appropriate power to identify the moderately strong correlations. Nevertheless, some limitations can be taken into account. The study involved the experiences of one tertiary care center, and the results might be hard to generalize. Also, certain confounders (e.g. intrapartum interventions, e.g., exposure to oxytocin) were not discussed in detail, although they may affect both the risks of severe PPH and the duration of labour.

Conclusively, this paper indicates that there is a strong relationship between long labour and postpartum hemorrhage. Vigilant labour management, timely assistance to long labour and more vigilant care among high risk women is suggested to decrease the severe PPH burden. Additional multicentered research of a larger sample size and broadly adjusting all possible confounding factors is needed to confirm these results and inform clinical practice.

CONCLUSION

The following study proves that a major connection exists between prolonged active labour and severe postpartum haemorrhage (PPH) in women with planned vaginal births. The Presence of prolonged labor that is defined as over 12 hours in the active phase was present in almost a third of participants and was positively associated with the occurrence of severe PPH. These results support the pathophysiological conception that prolonged uterine activity can provoke uterine atony which is the leading cause of primary PPH. The association also was consistent in stratified analyses of different demographic and obstetric subgroups indicating that the relationship is not chance and has clinical significance.

We have illustrated how in a delayed labor, early identification and intervention will help reduce the risk of PPH. With the inclusion of active surveillance and revised protocols, obstetric teams can advance maternal outcomes. Future multicentric trials should be carried out to prove these findings and provide evidence-based best practice.

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