

## “EVALUTION OF BLOOD LOSS FOLLOWING VAGINAL DELIVERY BY USING KELLY’S PAD”

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### ABSTRACT

**Introduction:** Post partum haemorrhage is defined as blood loss >500ml after vaginal delivery and >1000ml after caesarean section or any amount of blood loss that causes changes in hemodynamic status of the patient or decrease in haematocrit >10%. Post Partum Haemorrhage is a leading preventable cause of maternal morbidity and mortality. Objective measurement of blood loss using Kelly’s pad has shown to anticipate and thus prevent subsequent complications.

**Methods:** This prospective observational study was conducted on 500 pregnant females undergoing vaginal delivery. Measurement of blood was done using kelly’s pad in the third stage of labour. 500 ml blood loss was taken as a cutoff to consider it as significant blood loss.

**Results:** Quantitative methods of measuring obstetric blood loss have been shown to be more accurate than visual estimation in determining obstetric blood loss. Studies that have compared visual estimation to quantitative measurement have found that visual estimation is more likely to underestimate the actual blood loss when volumes are high and overestimate when volumes are low. Although quantitative measurement is more accurate than visual estimation for identifying obstetric blood loss, the effectiveness of quantitative blood loss measurement on clinical outcomes has not been demonstrated. The overall incidence of more than 500ml loss was 11.2%. The incidence of more than 500ml blood loss is higher in multigravida, induced labour, prolonged labour and >3.5 kg baby weight.

**Conclusion:** When compared to earlier techniques (such as visual estimation of blood loss, number of pads soaked, monitoring vitals and taking an estimate of blood loss, signs and symptoms of hypovolemia), Kelly's pad estimation of the mean blood loss is significantly more accurate, allowing for the prediction and prevention of maternal morbidity and mortality.

**Keywords:** Post Partum Haemorrhage, Kelly’s pad, 500ml

## **INTRODUCTION**

Post-partum haemorrhage is the leading cause of maternal morbidity and mortality and accounts for one quarter of cases of maternal mortality worldwide.<sup>1</sup> Generally, PPH requires early recognition of its cause immediate control of the bleeding source by medical, mechanical, invasive-nonsurgical and surgical procedures, rapid stabilization of the mother's condition, and a multidisciplinary approach.<sup>2</sup> Second-line treatment of PPH remains challenging since there is a lack of univocal recommendations from current guidelines and sufficient data from randomized controlled trials.<sup>3</sup>

The objective measurements using Kelly's pad have been shown to increase the accuracy of assessing postpartum blood loss, it helps us to act immediately to control the blood loss. Kelly's pad is a simple medical device to funnel blood to a collection device in order to help detect PPH. The device is widely used in India, though not elsewhere. The Kelly's pad funnels blood into a Calibrated collection bowl which has a haemorrhage alert line at 500ml. This simple tool not only has the potential for more accurate detection of postpartum blood loss , but also may improve timely response with the ultimate goal of decreasing maternal morbidity and mortality associated with obstetric haemorrhage. The pad is washable and sterilizable, making it far more cost-effective than a plastic collection drape.<sup>4</sup>



**Figure 1 : KELLY'S PAD**

## **AIMS AND OBJECTIVES**

### **AIM:**

- Standardize the blood loss by using a Kelly's pad following vaginal delivery.

### **PRIMARY OBJECTIVE:**

- Evaluation of amount of blood loss following vaginal delivery by using Kelly's pad.

### **SECONDARY OBJECTIVE:**

- To evaluate amount of blood loss in relation to maternal Age and gestational age.

- To evaluate average blood loss in primigravida and multigravida.
- To evaluate the amount of blood loss in complicated / assisted vaginal delivery.
- To evaluate the amount of blood loss in FTND with episiotomy & without episiotomy.
- To study the relation between duration of labour & amount of blood loss after delivery.
- To measure the amount of blood loss in delivery in different birth weight categories.
- To evaluate amount of blood loss in relation to PIH.
- To evaluate amount of blood loss in relation to spontaneous and induced labour.
- To measure amount of blood loss in induction with foley's catheter and PGE2 gel induction.

## **MATERIALS AND METHODS**

- **STUDY DESIGN:** Prospective observational Study.
- **STUDY AREA:** The study will be conducted at Department of Obstetrics and Gynaecology, G.M.E.R.S. Medical College, Sola, Ahmedabad.
- **STUDY PERIOD:** July 2021 to January 2022
- **STUDY POPULATION:** All pregnant women admitting in labour room are indicated for NVD fulfilling the inclusion criteria will be included in cases.
- **SAMPLE SIZE:** 500 pregnant women with inclusion criteria.
- **STUDY DESIGN:** Prospective observational Study.

## **SELECTION CRITERIA**

### **INCLUSION CRITERIA**

- Singleton live pregnant women
- $\geq 37$ -weeks gestational age

- Cephalic presentation
- vaginal delivery

### **EXCLUSION CRITERIA**

- Cesarean Section
- Breech Delivery
- Twins
- Transverse Lie
- Preterm
- Anemia (<9gm)
- Abruptio placenta
- Placenta previa

### **METHODOLOGY**

All pregnant women with term singleton cephalic pregnancy without any predefined obstetric or maternal indication were selected according to inclusion and exclusion criteria followed by informed written consent and routine sampling. A detailed history along with physical and obstetric examination was done, confirmation of gestational age was done by last menstrual period or clinical examination or earliest scan available to patient. All labour progress was monitored with partograph and foetal heart monitoring. Induction of labour was done in indicated cases with either PGE2 Gel or foley's catheter. All the patients were counselled about the procedure of estimation of blood loss. Delivery of all the patients were conducted according to standard practice of AMTSL.

1. Measurement of blood loss: Blood loss in the third stage of labour (after baby delivery and before placental delivery) was estimated by using the Kelly's pad. The rectangular part of the drape was slid under the mother's buttocks and the funnel portion was allowed to hang at the end of the labour cot. The blood collected into the pre scaled bucket, which have alert line at 500ml. The pad will be left in situ until the birth attendant is no longer concern about blood loss or the mother transfer to ward. This collected blood via Kelly's pad was noted.
2. Patients were divided in 2 groups according to estimation of blood loss.  
**Group A** - patients with post-partum blood loss < 500ml following a vaginal delivery.  
**Group B** - patients with post-partum blood loss > 500 ml following a vaginal delivery.

The pulse rate, blood pressure and the state of uterus were noted immediately after delivery then after 15min, 30min and 1hrs and any intervention required was done, which includes uterine massage, injection oxytocin, misoprostol or uterine packing. The women were kept under observation for the next two hours to watch for any complications.

Blood Hb% was measured 24hrs after delivery. Blood transfusion was given to those with Hb < 8gm and Oral or parenteral Iron therapy was given to hemodynamically stable patients with Hb >8 gm.

The patients were carefully watched in the postnatal ward for 48 hours for any morbidity.



**Figure 2: KELLY'S PAD**



**OBSERVATION AND RESULT**

**TABLE 1: DISTRIBUTION OF PATIENTS ACCORDING TO PARITY, AGE AND GESTATTIONAL AGE**

| Age (years)                          | Primigravida<br>(n=251) | Multigravida<br>(n=249) | Total<br>(N=500) |
|--------------------------------------|-------------------------|-------------------------|------------------|
| <25                                  | 153 (60.88%)            | 130 (52.29%)            | 283 (56.4%)      |
| 25-30                                | 95 (37.8%)              | 95(38.08%)              | 190 (38.4%)      |
| > 30 years                           | 3 (1.21%)               | 24 (9.63%)              | 27 (5.2%)        |
| GA (weeks)                           |                         |                         |                  |
| 37                                   | 10 (3.92%)              | 11 (4.48%)              | 21 (4.2%)        |
| 37 <sup>+1</sup> to 37 <sup>+6</sup> | 43 (16.86%)             | 37 (15.10%)             | 80 (16%)         |
| 38 <sup>+1</sup> to 38 <sup>+6</sup> | 86 (34.26%)             | 103 (41.36%)            | 189 (37.8%)      |
| 39 <sup>+1</sup> to 39 <sup>+6</sup> | 93 (36.47%)             | 72 (29.38%)             | 165 (33%)        |
| ≥ 40                                 | 19 (7.45%)              | 26 (10.61%)             | 45 (9%)          |

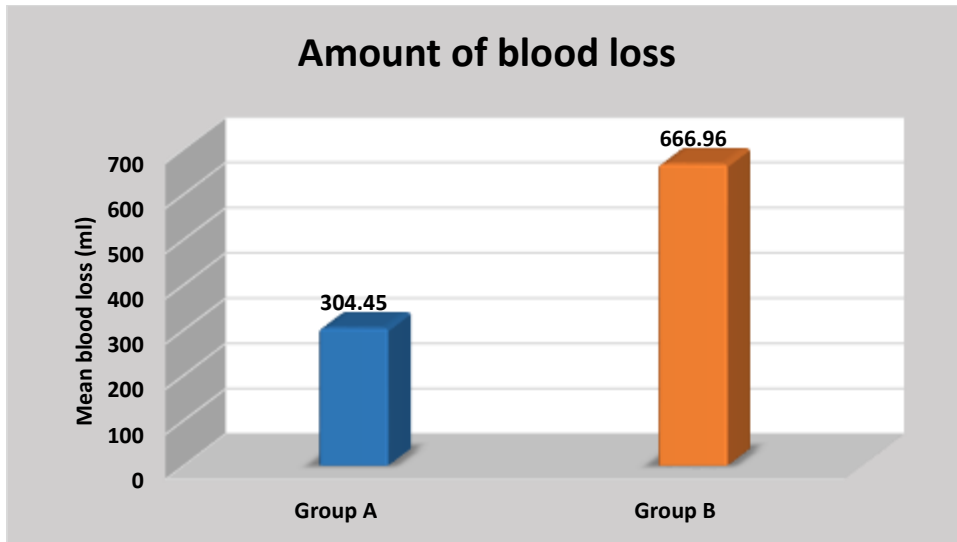
Above table suggests that 50.2 % patients among study population were Primigravida and 49.8 % were Multigravida. majority of patients (56.4 %) was < 25 years of age. Gestational Age of majority of patients (37.8%) was between 38<sup>+1</sup> to 38<sup>+6</sup> weeks.

**TABLE 2: DISTRIBUTION OF PATIENTS ACCORDING TO AMOUNT OF BLOOD LOSS ESTIMATED BY KELLY’S PAD.**

| Blood Loss (ml) | Group A<br>(n=444) | Group B<br>(n=56) | Total<br>(N=500) |
|-----------------|--------------------|-------------------|------------------|
| 100-200 ml      | 53(11.93%)         | 0                 | 53 (10.6%)       |
| 201-300 ml      | 161 (36.26%)       | 0                 | 161 (32.2%)      |
| 301-400 ml      | 177 (39.86%)       | 0                 | 177 (35.4%)      |
| 401-500 ml      | 53 (11.94%)        | 0                 | 53 (10.6%)       |



|                      |                   |                  |                   |
|----------------------|-------------------|------------------|-------------------|
| > 500 ml             | 0                 | 56 (100%)        | 56 (11.2%)        |
| <b>Total</b>         | <b>444 (100%)</b> | <b>56 (100%)</b> | <b>500 (100%)</b> |
| Mean Blood Loss (ml) | 297.97 ± 84.13    | 666.96 ± 191.8   | 326.43 ± 149.51   |



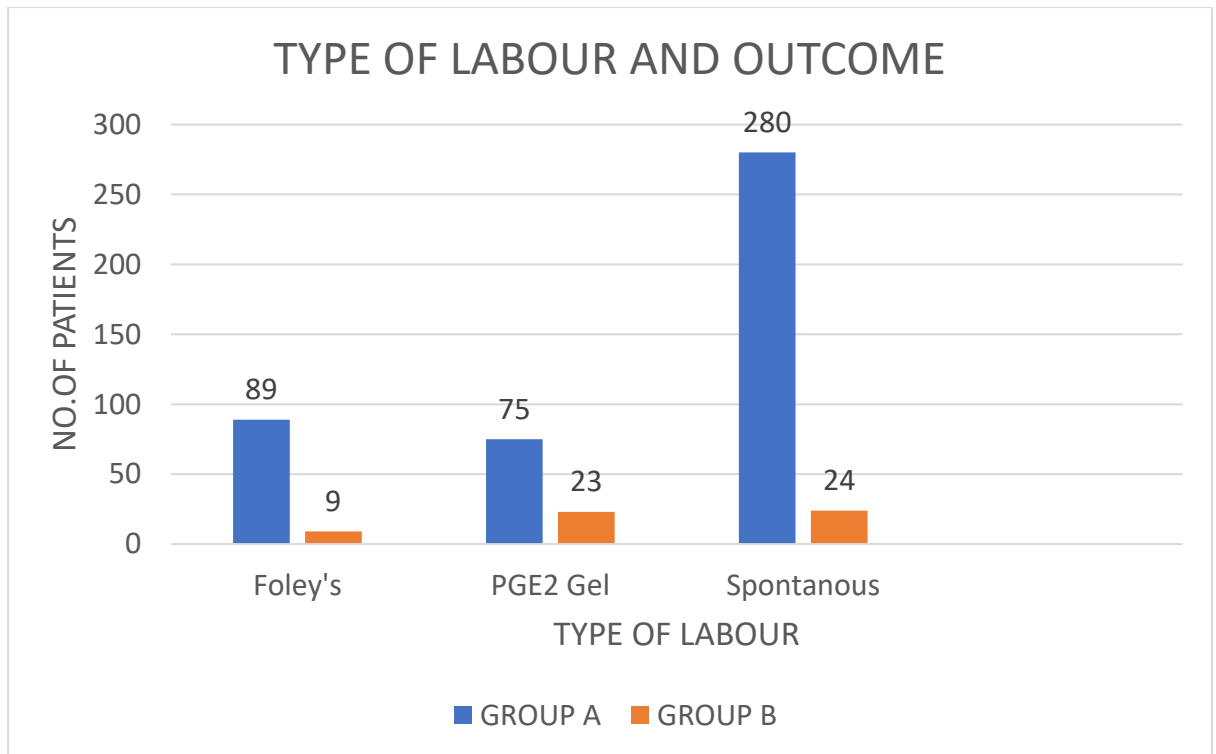
**Group A:** Postpartum blood loss less than 500 ml estimated by Kelly’s pad.

**Group B:** Postpartum blood loss more than 500 ml estimated by Kelly’s pad.

Majority of patients (39.86%) in Group A had blood loss of 300-400ml. The mean blood loss in Group A was (297.97 ± 84.13ml) and in Group B was (666.96 ± 191.8ml). Mean blood loss in whole study population was 326.43 ± 149.51 ml.

**TABLE 3: Comparison of amount of blood loss according to onset of vaginal delivery**

| Onset of Vaginal delivery | Group A (n=444) | Group B (n=56) | Total (N=500) | Mean blood loss (ml) |
|---------------------------|-----------------|----------------|---------------|----------------------|
| Foley’s induced           | 89 (20.04%)     | 9 (16.07%)     | 98 (19.6%)    | 320.91 ± 150.50      |
| CP Gel induced            | 75 (16.89%)     | 23 (41.07%)    | 98 (19.6%)    | 356.12 ± 191.74      |
| Spontaneous               | 280 (63.06%)    | 24 (42.85%)    | 304 (60.8%)   | 332.63 ± 152.37      |
| <b>Total</b>              | <b>444</b>      | <b>56</b>      | <b>500</b>    | -                    |
| <b>P value</b>            | <b>0.012</b>    |                |               |                      |



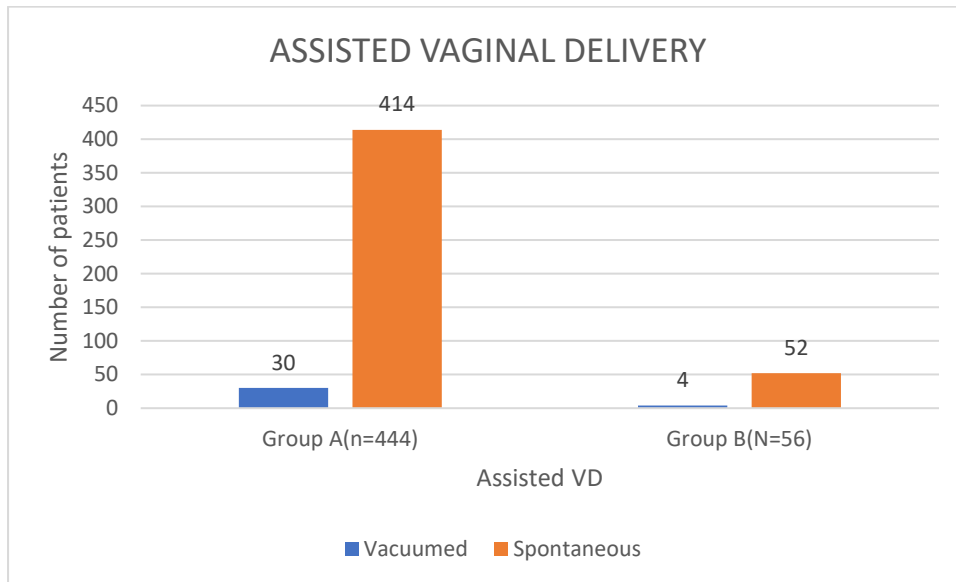
Above table shows that 56(28.57%) patients with induced labour had more than 500 ml of blood loss while only 7.89% of patients with spontaneously onset of labour had blood loss more than 500ml. Mean blood loss was higher in Induced labour ( $364.33 \pm 152.08$  ml) than Spontaneous ( $332.63 \pm 152.37$ ml). Statistically significant association noted between amount of blood loss and type of onset of labour. (p value - 0.005)

Among 56 patients in group B there was a 57.14% of induced patients and 42.85% of patients Delivered Spontaneously.

**TABLE 4: Comparison of amount of blood loss in relation to ASSISTED VAGINAL DELIVERY.**

| Assisted VD | Group A<br>(n=444) | Group B<br>(n=56) | Total<br>(N=500) | Mean blood loss<br>(ml) |
|-------------|--------------------|-------------------|------------------|-------------------------|
| Vacuumed    | 30 (88.23%)        | 4 (11.77%)        | 34 (100%)        | $352.20 \pm 152.35$     |
| NVD         | 414 (88.84%)       | 52 (11.16%)       | 466 (100%)       | $344.52 \pm 152.08$     |

|                |            |           |            |          |
|----------------|------------|-----------|------------|----------|
| <b>Total</b>   | <b>444</b> | <b>56</b> | <b>500</b> | <b>-</b> |
| <b>P value</b> | 0.9139     |           |            |          |



Above table shows that 11.77% patients with assisted VACCUM DELIVERY had more than 500 ml of blood loss while 11.16 % of patients with normal vaginal delivery also had blood loss more than 500 ml. There is no significant association noted between amount of blood loss and ASSISTED VAGINAL DELIVERY. (p value 0.9139)

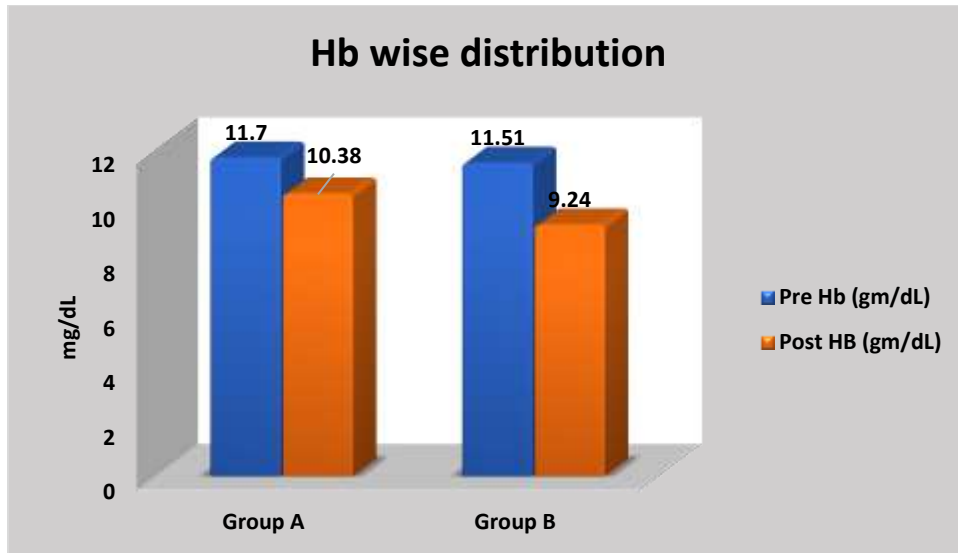
The mean blood loss in VACCUM DELIVERY was (352.20 ± 152.35 ml) while the mean blood loss in normal VAGINAL DELIVERY was (344.52 ± 152.08 ml).

Among 56 patients in group B there was 7.14% of patients with vacuumed delivery and 92.86% of patients with spontaneous delivery.

**TABLE 5: Comparison of amount of blood loss in relation to haemoglobin**

| Haemoglobin | Group A<br>(n=444) | Group B<br>(n=56) | Total<br>(N=500) | P value |
|-------------|--------------------|-------------------|------------------|---------|
|             |                    |                   |                  |         |

|                    |              |              |              |         |
|--------------------|--------------|--------------|--------------|---------|
| Pre Hb (gm/dL)     | 11.70 ± 1.16 | 11.51 ± 1.16 | 11.68 ± 1.16 |         |
| Post HB (gm/dL)    | 10.38 ± 1.46 | 9.24 ± 1.46  | 10.25 ± 1.46 | <0.0001 |
| Reduced Hb (gm/dl) | 1.32         | 2.27         |              |         |



On admission Mean HB in group A was (11.70 ± 1.16 gm/dl) and in group B was (11.51 ± 1.16 gm/dl). After 24 hrs of delivery the Mean HB was (10.38 ± 1.46 gm/dl) in Group A and (9.24 ± 1.46 gm/dl) in group B. The difference in HB pre- and post-delivery is found to be statically significant among both groups. (p value< 0.0001)

The post-partum average reduction in HB was 1.32 gm/dl in group A and 2.27 gm/dl in group B.

**TABLE 6: comparison of amount of blood loss in relation to DURATION OF LABOUR.**

| Duration of labour(hours) | Group A (n=444) | Group B (n=56) | Total (N=500) | Mean blood loss (ml) | P value           |
|---------------------------|-----------------|----------------|---------------|----------------------|-------------------|
| • Duration ≤3 hrs         | 3 (23.07%)      | 10 (76.93%)    | 13 (100%)     | 594.60 ± 152.10      | <b>&lt;0.0001</b> |
| • Normal                  | 437 (92.78%)    | 34 (7.22%)     | 471 (100%)    | 330.99 ± 152.23      |                   |
| • Prolonged labour        | 4 (25%)         | 12 (75%)       | 16 (100%)     | 556.25 ± 150.72      |                   |

As per above table, in normal duration of labour, the mean blood loss was (330.99 ± 152.23ml) where as in labour ≤ 3hrs and in prolonged labour mean blood loss was (594.60 ± 152.10ml) and (556.25 ± 150.72ml) respectively. Blood loss more than 500 ml was found in 76.93% of patients with ≤ 3hrs duration of labour and 75 % of patients with prolonged labour in comparison to only 7.22% of patients with normal duration of labour.

This is statistically significant between blood loss and Duration of labour. (p value - <0.0001)

Among 56 patients in group B there was 21.42% of patients with Prolonged labour.

**TABLE 7: MATERNAL OUTCOME BETWEEN TWO GROUP**

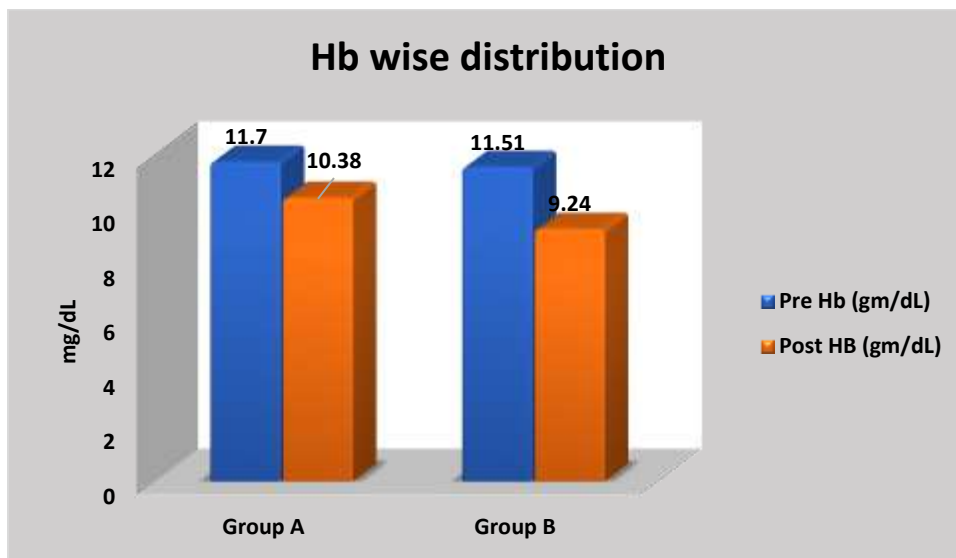
|                     | Group A (n=444) | Group B (n=56) | Total (N=500) |
|---------------------|-----------------|----------------|---------------|
| Blood Transfusion   |                 |                |               |
| • Yes               | 0(0%)           | 12 (21.42%)    | 12 (2.4%)     |
| • No                | 444 (100%)      | 44 (78.57%)    | 488(97.6%)    |
| Hospital Stay (day) | 3.50 ± 0.90     | 6.85 ± 1.50    | 3.69 ± 1.22   |

Out of 56 patients, in group B only 12 patients needed blood transfusion in my study. Rest of 44 patients were given oral or parenteral iron therapy. None of the patients in group a needed blood transfusion.

The hospital stays were also higher in group B ( $6.85 \pm 1.50$ -day) as compared to Group A ( $3.50 \pm 0.90$  days).

**TABLE 8: Comparison of amount of blood loss in relation to haemoglobin**

| Haemoglobin        | Group A<br>(n=444) | Group B<br>(n=56) | Total<br>(N=500) | P value           |
|--------------------|--------------------|-------------------|------------------|-------------------|
| Pre Hb (gm/dL)     | $11.70 \pm 1.16$   | $11.51 \pm 1.16$  | $11.68 \pm 1.16$ |                   |
| Post HB (gm/dL)    | $10.38 \pm 1.46$   | $9.24 \pm 1.46$   | $10.25 \pm 1.46$ | <b>&lt;0.0001</b> |
| Reduced Hb (gm/dl) | 1.32               | 2.27              |                  |                   |



On admission Mean HB in group A was ( $11.70 \pm 1.16$  gm/dl) and in group B was ( $11.51 \pm 1.16$  gm/dl). After 24 hrs of delivery the Mean HB was ( $10.38 \pm 1.46$  gm/dl) in Group A and ( $9.24 \pm 1.46$  gm/dl) in group B. The difference in HB pre- and post-delivery is found to be statically significant among both groups. (p value< 0.0001)

The post-partum average reduction in HB was 1.32 gm/dl in group A and 2.27 gm/dl in group B.

## COMPARISION WITH OTHER STUDIES

The overall incidence of more than 500ml was 11.2% in the present study. The incidence of more than 500ml in this study was lower than that reported previously such as **Sosa G et al**<sup>4</sup> (14.11%) and **Miyoshi Y et al**<sup>5</sup> (16.03%) and higher than **Fukami T et al**<sup>6</sup> (9.53%). Our institute is tertiary centre so, incidence of more than 500ml blood loss is higher due to more numbers of referred patients are admitted.

## **CONCLUSION**

The estimation of the mean blood loss with Kelly's pad is significantly more accurate than the previously used visual methods. Significant blood loss can be appreciated faster and in case of PPH, early interventions can be taken leading to reduced maternal morbidity and mortality.

The overall incidence of more than 500ml was 11.2% in my study. The incidence of more than 500 ml blood loss is higher in multigravida, induced labour, prolonged labour and > 3.5 kg baby weight.

In multigravida, early estimation of more than average blood loss will decrease incidence of anaemia and also less blood transfusions and also decrease maternal mortality and morbidity due to PPH. So, we should counsel for early family planning measures, so that parity of the women can be controlled and the incidence of grand multipara will be more decreased.

Previously, it was very difficult to anticipate PPH, which led to increased maternal mortality and morbidity. But nowadays, using tools like Kelly's pad can help us estimate the amount of blood loss and intervene accordingly. The alert line in Kelly's pad (above 500ml) is sign that health worker has to be vigilant about and take intervention to reduced maternal morbidity and mortality.

## **RECOMMENDATIONS**

The scope of Kelly's pad is in its use to estimate the blood loss caused after vaginal delivery, allowing the health care workers to take early interventions in case of blood loss more than average, thus reducing maternal morbidity and mortality.

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