"PROSPECTIVE STUDY OF ASSOCIATION OF UTERINE ATONICITY AND PPH WITH SERUM CALCIUM LEVELS"

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LIST OF ABBREVIATIONS

CVA	-	Cardiovascular Accidents
g/dl	-	gram per deciliter
GA	-	Gestational Age
Hb	-	Hemoglobin
IV	-	Intravenous
LSCS	-	Lower Segment Cesarean Section
mg/dl	-	milligram per deciliter
ml	-	millilitre
PPH	-	Post Partum Hemorrhage
Sr	-	Serum
WHO	-	World Health Organization
>	-	More than
≥	-	More than or Equal
<	-	Less than

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1. INTRODUCTION

Postpartum hemorrhage is the leading cause of maternal death in low-income countries and is the primary cause of approximately one-third of global maternal deaths.[1] In any community, maternal mortality is considered as a proxy and vital indicator of the health development of that community. Majority of these maternal deaths are preventable and treatable.[2] Hence, Maternal health is the target 3 of the Goal 3 of the sustainable development goals of the United Nations and WHO. Their aim is reducing the global maternal mortality rate less than 70 per 1 lakh live births and the target of 3.1 by 2030.[3]

According to National Health Mission's report in their 2016-2018 Sample Registration System [SRS] data, Maternal Mortality Ratio in India is 113 per one lakh live births and Maternal Mortality Ratio in Karnataka is 92 per one lakh live births. [4] Nearly two thirds of these maternal deaths are caused by hemorrhage after the child birth, infections after the child birth, high blood pressure during gestation and unsafe abortions.[2] According to a WHO systematic analysis on Global causes of maternal death, 19.7% of the deaths were attributed to the postpartum hemorrhage. Other important causes were complications of the delivery and obstructed labor.

There are several causes of PPH like Atonic PPH, traumatic PPH, Retained tissues and coagulopathy. However, Uterine atony is the most common cause of PPH leading to maternal morbidity and mortality. The prevalence of 6% of PPH is reported by WHO globally and this accounts for 38 % of the maternal deaths. One fourth of the estimated 303000 maternal deaths globally is attributed to the PPH. [5, 6]

Management of Atonic PPH includes following measures: Active management of the third stage of labor, administration of Uterotonics- like methergine, oxytocin,

carboprost, misoprostol and several surgical interventions like Hayman sutures, B Lynch sutures, Uterine artery ligation, Internal Iliac artery ligation.

Use of tocolytic drugs is known to cause Atonic PPH by their calcium blocking effect. Calcium being one of the major nutrients in the human body, plays a vital role in the labor. The induction and progression of labor involves the contractile system of myocyte of the uterus. It involves the interaction of myofilaments, Actin and Myosin. The cross-bridge formation and contraction is mediated by elevated calcium and myosin light chain phosphorylation. Thus, calcium is vital even in the stoppage of bleeding after delivery. Occlusion of the vessels post placental expulsion, is by interlacing of intermediate layer of the myometrium, which mainly depends on the contractility of the uterus. This mechanism is called as living ligature, mainly involved in hemostasis. Agents like prostaglandin F2 alpha and oxytocin that promote contraction act on myometrial cells to increase intracellular cytosolic calcium concentration. Or, they allow an influx of extracellular calcium through ligand- or voltage- regulated calcium channels. Hence it is very important to maintain optimum levels of calcium for the effective uterine contraction.[7]

Patients with PPH due to atonic uterus that had not responded to the usual oxytocic's have responded well with IV Calcium gluconate with marked hardening of uterus and lessening PPH. [8] Higher serum calcium levels have been reported in pregnant women at the time of vaginal delivery as compared to term women who were not in labor and delivered by cesarean operation. Also, myometrial contractility is improved by normo-calcemia and avoiding hypocalcemia.[9]

Calcium supplementation during the active management of the third stage of labor in combination with the oxytocin has been used to prevent and treat PPH due to atonicity of uterus**.**[10] It was speculated that the higher serum calcium levels played a

role in the mechanism of initiation of labor which is the result of adequate uterine smooth muscle contraction.[9] Reduced serum calcium level may affect the contractility of uterine smooth muscle, resulting in atonic uterus and PPH. Hence this study is to determine the association of serum calcium levels with uterine atonicity and PPH in a tertiary care hospital.

2. OBJECTIVE

To determine the association of serum calcium levels with uterine atonicity and PPH in a tertiary care hospital.

3. REVIEW OF LITERATURE

Burden of the Disease: Post-Partum Hemorrhage:

In any community, maternal mortality is considered as a proxy and vital indicator of the health development of that community. Majority of these maternal deaths are preventable and treatable.[2] According to WHO, 810 women die every day worldwide from preventable causes related to pregnancy and childbirth. The major causes of these deaths are

1. Severe bleeding [mostly bleeding after child birth]
2. Infections
3. Complications from delivery
4. High blood pressure during pregnancy
5. Unsafe abortions

WHO suggests that 25% of maternal deaths worldwide is due to PPH. PPH causes around 14 million death every year globally. The incidence of the PPH among women after vaginal delivery is around 4% and 6% post LSCS. Around 50% of this PPH deaths are due to Uterine Atony. In India, PPH accounts to 38% of the maternal deaths.[11]

Carroli G et al. conducted a systematic review to understand the epidemiology of post-partum hemorrhage. With an objective of evaluating the magnitude of the PPH globally they selected 120 articles. The prevalence of the PPH and severe PPH were 6% and 1.86% respectively. But they also said that the magnitude varied region wise greatly.[12\]

UTERINE BLOOD FLOW

Uterine blood flow during pregnancy is a low resistance, low pressure, high flow System.Uterine blood flow increases from 50 mL/min to 1 L/min or more at term. Almost 90% of the flow is directed to the placental intervillous spaces for transplacental exchange with the fetus. Approximately 200 spiral arteries underlie the developing placenta. This area is invaded by trophoblastic cells, which erode the elastic and muscular components of the arteries, exposing them to systemic blood pressure. Uterine blood flow ceases or is greatly diminished with contraction of the uterus.

Three interrelated physiological mechanisms for this:

1) Contraction and Retraction of the oblique uterine muscle fibres in the upper uterine wall, which are arranged in criss cross manner, with vessels intertwined between them act as –LIVING LIGATURE, minimizing the blood loss.

2) Following separation, the strong uterine contraction brings the uterine walls into apposition so that further pressure is exerted on the placental site, so that the torn vessels are occluded by themselves.

3) There is increased activation of the coagulation and fibrinolytic system around the placental site so clot formation in the torn vessel is intensified. Main mechanism is the contraction of uterine musculature. [13]

POST-PARTUM HEMORRHAGE:

Definition: According to WHO, Postpartum Hemorrhage (PPH) is commonly defined as a blood loss of 500 ml or more within 24 hours after birth**.** Severe PPH is defined as a blood loss of 1000 ml or more within the same timeframe.[14]

Clinical Definition: Any amount of bleeding from or into the genital tract following birth of the baby up to the end of the puerperium, which adversely affects the general condition of the patient evidenced by rise in pulse rate and falling blood pressure is called postpartum hemorrhage.[15]

Classification: Post-partum hemorrhage is classified based on two factors namely,

A] Based on the amount of blood loss

1. **Minor PPH**: If the amount of blood loss is less than 1000ml, it is called minor PPH.
2. **Major PPH:** If the amount of blood loss is more than 1 liter of blood, it is called major PPH.
3. **Severe PPH**: If the amount of blood loss is more than 2000ml of blood, then it is called severe PPH.

B] Types of PPH

1. **Primary PPH**: PPH occurring within 24 hours after the delivery, then it is termed as primary PPH. Primary PPH is further classified into two types based on the timing of the placental expulsion namely third stage hemorrhage and true post-partum hemorrhage.
    a) **Third stage hemorrhage:** PPH occurring before the expulsion of the placenta is called as third stage hemorrhage
    b) True post-partum hemorrhage: PPH occurring after the expulsion of the placenta is called as true post-partum hemorrhage. It is the most common type of PPH amongst the classification.[15]
2. **Secondary PPH**: PPH occurring beyond 24 hours of the delivery is termed as secondary PPH. This is also called as late post-partum hemorrhage.[16]

Risk factors for PPH: According to Royal College of Obstetrics and Gynecology below mentioned are the risk factors mentioned along with the causes and the strength of the risk associated with each. [17]

Table 3.1: Risk factors for the PPH. [17]

Sl no	Risk factors	Cause	Odd's Ratio
1	Multiple Pregnancy	Tone	4.70
2	Previous PPH	Tone	3.60
3	Pre-eclampsia	Thrombin	5.00
4	Retained placenta	Tissue	7.83
5	Placental accreta	Tissue	3.30
6	Perineal laceration	Trauma	2.40
7	Non-progression of the labor	Tone	2.90

Risk Assessment Tools:[18] American College of Obstetrics and Gynecology gives the risk assessment tool for predicting the occurrence of the PPH**.** Risk is divided into three categories as low risk, medium risk and high risk.

a. Low risk:

- Singleton pregnancy
- < 4 previous deliveries
- Unscarred uterus
- No past history of PPH

b. Medium Risk:

- Prior cesarean or uterine surgery
- > 4 previous deliveries
- Multiple gestation

- Large uterine fibroids
- Prolonged use of oxytocin
- Magnesium sulphate use
- chorioamnionitis

c. High Risk:

- Previa, accrete, increta, percreta
- Past history of PPH
- Hematocrit <30
- Abnormal vital signs
- Known coagulation disorders

Causes of PPH: Royal College of Obstetrics and Gynecology explains the causes of PPH in 4T concept. The details are mentioned in the figure 3.1 below.

Figure 3.1: Causes of PPH. [17]

The four Ts	Risk factors/notes
Tone: abnormalities of uterine contraction	
Overdistension of uterus	Polyhydramnios, multiple gestation, macrosomia
Intra-amniotic infection	Fever, prolonged rupture of membranes
Functional/anatomic distortion of uterus	Rapid labour, prolonged labour, fibroids, placenta praevia, uterine anomalies
Uterine relaxants, e.g. magnesium and nifedipine	Terbutaline, halogenated anaesthetics, glyceryl trinitrate
Bladder distension	May prevent uterine contraction
Tissue: retained products of conception	
Retained cotyledon or succenturiate lobe	
Retained blood clots	
Trauma: genital tract injury	
Lacerations of the cervix, vagina or perineum	Precipitous delivery, operative delivery
Extensions, lacerations at caesarean section	Malposition, deep engagement
Uterine rupture	Previous uterine surgery
Uterine inversion	High parity with excessive cord traction
Thrombin: abnormalities of coagulation	
Pre-existing states	
Haemophilia A	History of hereditary coagulopathies or liver disease
Idiopathic thrombocytopenic purpura	Bruising
von Willebrand's disease	
History of previous PPH	
Acquired in pregnancy	
Gestational thrombocytopenic	Bruising
Pre-eclampsia with thrombocytopenia e.g. HELLP	Elevated blood pressure
Disseminated intravascular coagulation	
a) Gestational hypertensive disorder of pregnancy with adverse conditions	Coagulopathy
b) in utero fetal demise	Fetal demise
c) severe infection	Fever, neutrophilia/neutropenia
d) abruption	Antepartum haemorrhage
e) amniotic fluid embolus	Sudden collapse
Therapeutic anticoagulation	History of thromboembolic disease

Abbreviations: HELLP haemolysis, elevated liver enzymes and low platelet count; **PPH** postpartum haemorrhage.

Clinical Signs and symptoms according to the severity of the Hemorrhage:[18]

1. Blood loss up to 1000 ml
    - Normal pulse
    - Normal blood pressure
2. Blood loss 1000-1500 ml
    - Tachycardia
    - Tachypnoea
    - Slight fall in the systolic blood pressure
3. Blood loss >1500 ml
        - Systolic blood pressure below 80 mm of Hg
    - Worsening Tachycardia
    - Worsening Tachypnoea
    - Altered mental state

Prevention Methods:[15] PPH cannot always be prevented. But incidence of the PPH can be prevented by following guidelines

a. Ante-natal: Improvement of the health status, Blood grouping, correction of anemia, proper antenatal care, placental localization.

b. **Intra-natal:** Active management of the third stage of labor.

An intelligent anticipation, skilled supervision, prompt detection and effective institution of therapy can prevent large number of causalities of PPH.

Uterine Atony:

- Uterine atony is described as failure of the uterus to contract efficiently after delivery and to arrest the bleeding from the vessels at the placental implantation site.[16]
- It remains the most common cause of PPH and accounting to 70-80% of the PPH.
- Clinically, identification of a soft, poorly contracted [boggy] uterus suggests Atonic uterus.
- In case of atonic uterus, bladder is to be emptied and uterine massage, bimanual compression of the uterus will help arrest the bleeding.
- In addition to the oxytocin, supplemental uterotonics like misoprostol, prostaglandins F 2 alpha and methylergonovine is added.[18]

Management: Management of PPH can be classified into

1. **Medical management:** Uterotonics are the first line management of PPH caused by the uterine atony. The details of the drugs used are given in the figure 3.2 below. **[19,20]**
2. **Tamponade Techniques:** If the uterotonics does not stop the hemorrhage, then tamponade techniques are used. Commonly used tamponades are foley 's catheter, uterine packing and commercially available intrauterine balloon tamponade devices.**[18]**
3. **Uterine Artery Embolization:** It involves embolization of the uterine artery to stop the hemorrhage. It is one of the uterine salvage techniques. It has success rate of 89% in case of atonic PPH. Complications can arise due to this technique.**[18]**

Figure 3.2: Uterotonic drugs and their characteristics.[18]

Drug*	Dose and Route	Frequency	Contraindications	Adverse Effects
Oxytocin	IV: 10–40 units per 500–1,000 mL as continuous infusion or IM: 10 units	Continuous	Rare, hypersensitivity to medication	Usually none. Nausea, vomiting, hyponatremia with prolonged dosing. Hypotension can result from IV push, which is not recommended.
Methylergonovine	IM: 0.2 mg	Every 2–4 h	Hypertension, preeclampsia, cardiovascular disease, hypersensitivity to drug	Nausea, vomiting, severe hypertension particularly when given IV, which is not recommended
15-methyl $PGF_{2\alpha}$	IM: 0.25 mg Intramyometrial: 0.25 mg	Every 15–90 min, eight doses maximum	Asthma. Relative contraindication for hypertension, active hepatic, pulmonary, or cardiac disease	Nausea, vomiting, diarrhea, fever (transient), headache, chills, shivering hypertension, bronchospasm
Misoprostol	600–1,000 micrograms oral, sublingual, or rectal	One time	Rare, hypersensitivity to medication or to prostaglandins	Nausea, vomiting, diarrhea shivering, fever (transient), headache

Abbreviations: IV, intravenously; IM, intramuscularly; PG, prostaglandin.
*All agents can cause nausea and vomiting.

4. **Surgical Management:** It involves uterine compression sutures and hysterectomy. Haymanns and B-lynch sutures are the commonly used uterine compression sutures.

The management of the PPH is summarized in the figure 3.3 below.[21]

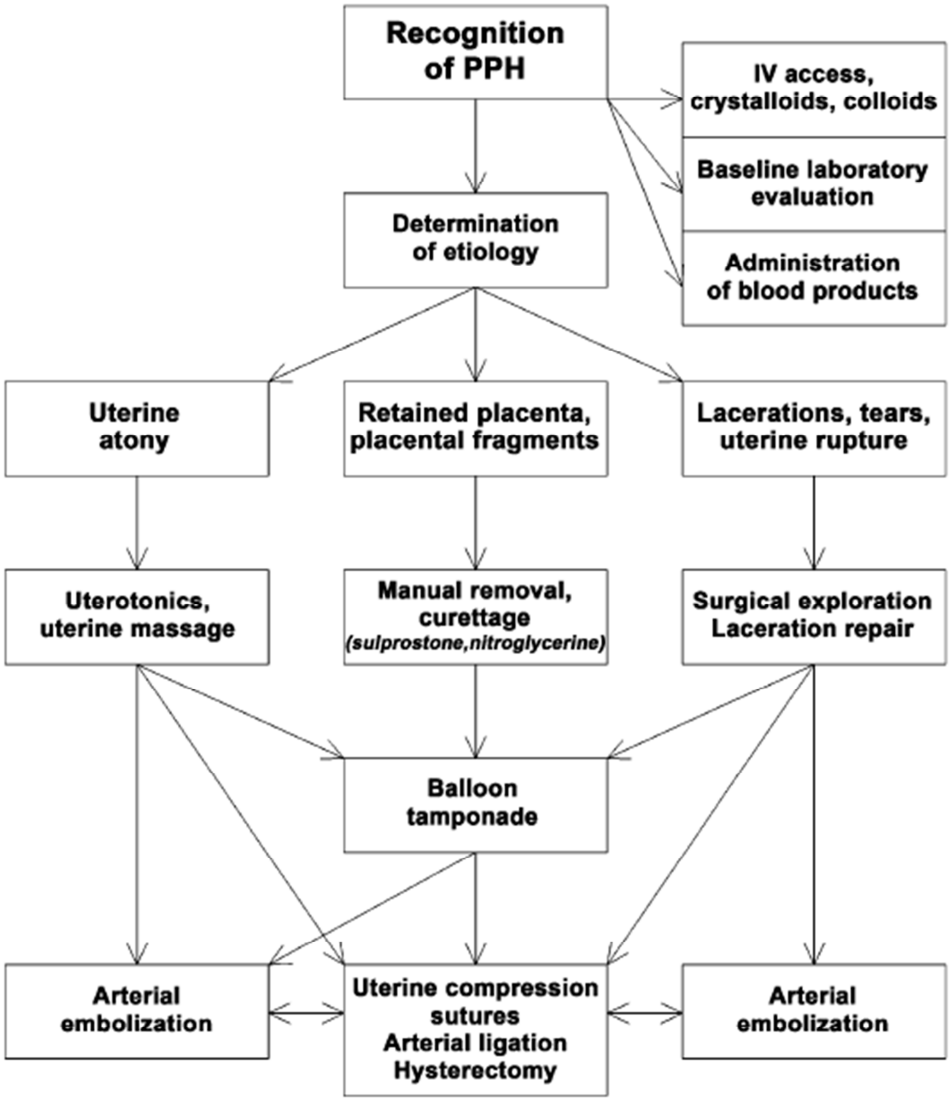


Figure 3.3: Summary of the PPH management.[21]

Articles on uterine blood flow during pregnancy, explains the clinical importance of the uterine blood flow dynamics in the hemorrhage. Acute moderate hemorrhage causes minimal changes in maternal blood pressure and pulse rate. However, these parameters are maintained by peripheral vasoconstriction with an inevitable decrease in placental blood flow. Acute severe hemorrhage (1500 ml. in 15 minutes) evokes a further increase in peripheral and uterine vasoconstriction with an

associated decrease in systemic blood pressure. Together, these two factors cause a marked decrease in placental perfusion. Acute severe hemorrhage may rapidly compromise the fetus even when the pre-hemorrhage status of placental perfusion is optimal. At slower rates of blood loss, the degree of peripheral vasoconstriction necessary to maintain maternal integrity will be less because of compensatory shifts of body fluids into the vascular compartment, and placental perfusion will not be reduced so drastically. Therapy for blood loss should be directed toward correcting the vascular volume capacity discrepancy**.** [22,23]

Importance of Serum Calcium in Atonic PPH:

Myometrial contraction is by the interaction of myosin and actin**.** Actin and myosin proteins are essential for uterine muscle contraction. For this, actin must be converted from a globular to a filamentous form. A potential mechanism for maintenance of relaxation is the promotion of actin into a globular form rather than into fibrils, which are required for contraction (Fig. 3.4). Moreover, actin must be attached to the cytoskeleton at focal points in the cell membrane to allow tension to develop. Actin must partner with myosin, which is composed of multiple light and heavy chains. The coupling of myosin and actin activates adenosine triphosphatase (ATPase), which hydrolyzes adenosine triphosphate, and generates force. This interaction is brought about by enzymatic phosphorylation of the 20-kDa light chain of myosin (Stull, 1998). This is catalyzed by the enzyme myosin light-chain kinase, which is activated by calcium. Calcium binds to calmodulin, a calcium-binding regulatory protein, which in turn binds to and activates myosin light chain kinase. Thus, logically, uterine relaxation ordinarily is promoted by conditions that lower concentrations of (Ca2 +) In contrast, agents that prompt contraction act on

myometrial cells to augment (Ca2 +) levels. Or, they allow an influx of extracellular calcium through ligand- or voltage-regulated calcium channels (see Fig. 3.4) .

Voltage-gated ion channels open, additional calcium ions move into the cell, and cellular depolarization follows. For example, prostaglandin F2 alpha and oxytocin bind their respective receptors during labor to open ligand-activated calcium channels.

Activation of these receptors also releases calcium from the sarcoplasmic reticulum to lower electronegativity within the cell. Additionally, greater localization of nonselective cation channels on the cell membrane promotes Ca2 + entry. The rise in (Ca2 +) levels is often transient. But contractions can be prolonged by inhibition of myosin phosphatase, an enzyme which dephosphorylates myosin. [16]

Figure 3.4: Uterine Myocyte Contraction and Relaxation. [16]

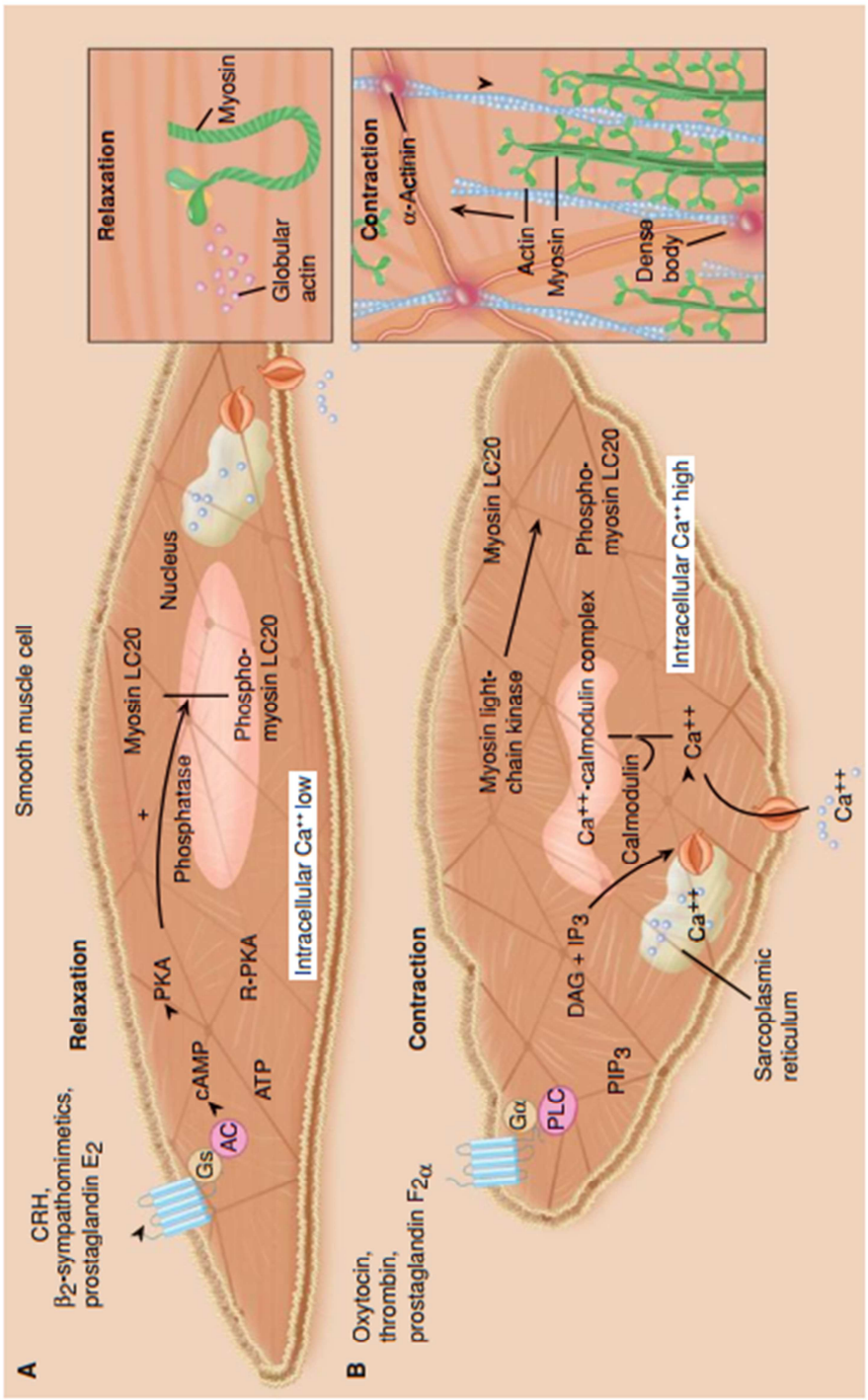


FIGURE 21-11 Uterine myocyte relaxation and contraction. **A.** Uterine relaxation is maintained by factors that increase myocyte cyclic adenosine monophosphate (cAMP). This activates protein kinase A (PKA) to promote phosphodiesterase activity with dephosphorylation of myosin light-chain kinase (MLCK). There are also processes that serve to maintain actin in a globular form, and thus to prevent fibril formation necessary for contractions. **B.** Uterine contractions result from reversal of these sequences. Actin now assumes a fibrillar form, and calcium enters the cell to combine with calmodulin to form complexes. These complexes activate MLCK to bring about phosphorylation of the myosin light chains. This generates ATPase activity to cause sliding of myosin over the actin fibrils, which is a uterine contractor. AC = adenylyl cyclase; Ca^{++} = calcium; DAG = diacylglycerol; Gs and Gα = G-receptor proteins; IP_3 = inositol triphosphate; LC20 = light chain 20; PIP_3 = phosphatidylinositol 3,4,5-triphosphate; PLC = phospholipase C; R-PKA = inactive protein kinase. (Redrawn from Smith, 2007.)

CALCIUM IN THE UTERINE EXICTABILITY

3 mechanisms involved

A. Ca entry via voltage-operated channels (VOC) after depolarization, which can - arise spontaneously within myometrial membrane. Entry of Ca will lead to further depolarization.

B. increase in intracellular Ca concentration produced by agonists binding to a receptor, as occurs in pharmacochemical coupling. Binding to receptor stimulates receptor-operated channels (ROC) that allow cations to enter. This will cause depolarization, which will then activate VOC, and hence Ca will enter.

C. increase in Ca produced by agonist-induced Ca release from internal stores. Binding of agonists stimulates a G protein that activates phosphoinositide C, which produces inositol 1,4,5-trisphosphate (IP,) and diacylglycerol (DAG) from phosphatidylinositol 4,5- bisphosphate (PIP2) in membrane. IP3 then causes Ca to be released from internal store (sarcoplasmic reticulum), and thus Ca is increased. [24]

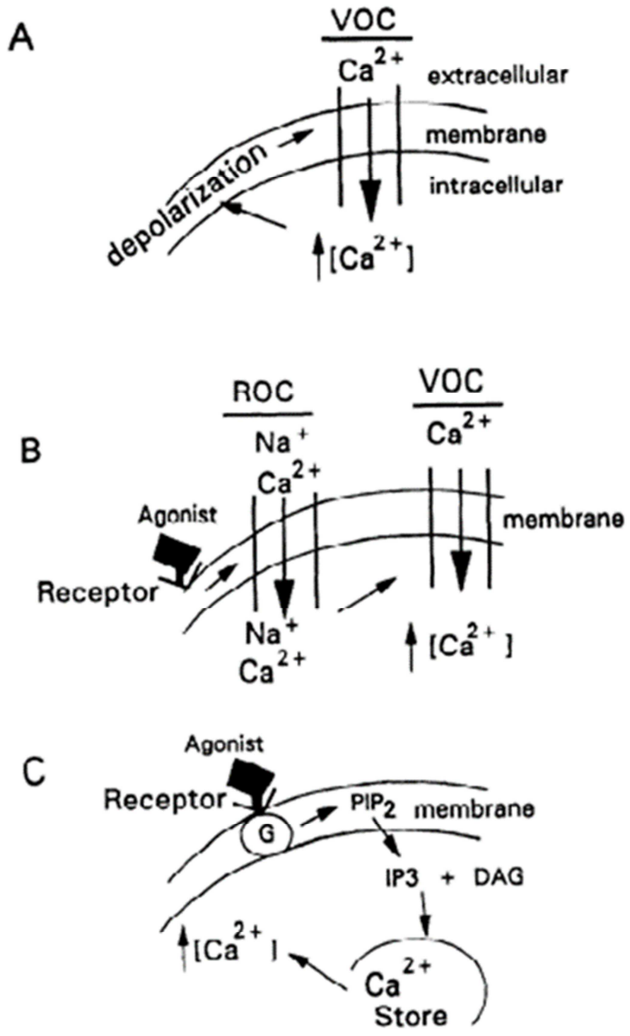


Figure 3.5 : : Electrophysiological Mechanism of the Uterine excitability

OXYTOCIN

Binding of oxytocin to its receptor activates Gαq/11 which activates PLC-β, which in turn hydrolyses PIP2 to IP3 and DAG. IP3 causes release of Ca from the sarcoplasmic reticulum (SR) and DAG activates PKC. Activation of Gαq/11 cause the opening of voltage-operated Ca channels and Ca2+ entry. Inhibition of the Ca-ATPase pump inhibits Ca exit from the cell, thus promoting elevated [Ca]. The combined elevation in [Ca] leads to formation of the Ca-calmodulin complex which then activates MLC kinase, resulting in acto-myosin crossbridge cycling and

myometrial contraction. DAG activated PKC also signals for phosphorylation of CPI-17 whilst oxytocin binding to OTR also activates Rho-A which in turn activates ROCK. Both phosphorylated CPI-17 and ROCK inhibit MLCP leading to increased MLC phosphorylation and is the proposed mechanism of Ca sensitization in the myometrium. Oxytocin receptor signaling in other uterine tissues also signals for prostaglandin production which may mediate local paracrine signaling within the myometrium**.** [25,26]

Since calcium is involved in the uterine myocyte contractility, its importance is to be considered in case of uterine atony which is failure of uterine muscle contraction. Hence serum calcium levels also become important in cases of uterine atony and also atonic PPH.

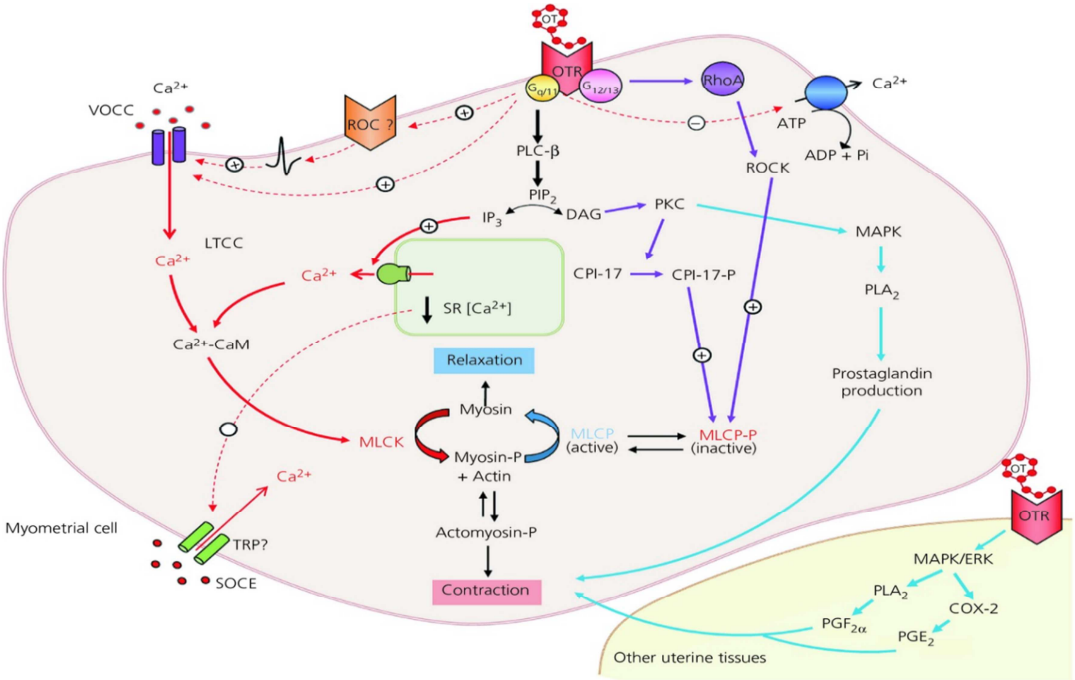


Figure 3.6: Mechanism of action uterotonics.[26]

{OTR: oxytocin receptor, ROC: Receptor operated channel, VOCC: voltage operated Ca channel, LTCC: L-type Ca channel, TRP: Transient receptor potential channel: PLC-β: phospholipase C-β, PIP2: phosphatidylinositol 4,5-bisphosphate,

IP3: inositol 1,4,5- triphosphate, DAG: diacylglycerol, PKC: protein kinases type C, CPI-17: C-kinase-activated protein phosphatase-1 (PP1) inhibitor 17kDa, CaCAM: Ca-calmodulin complex, MLCK: myosin light-chain kinase, MLCP: myosin light chain phosphatase, MAPK: mitogen-activated protein kinase, ERK: extracellular signal-regulated protein kinase, LA2: phospholipase A2, ROCK: RhoA-associated protein kinase, SOCE: store-operated Ca entry.}

PGE1 and PGF2 alpha

Prostaglandins acts on the receptors and cause calcium influx via voltage gated calcium channels and also activates calcium release from sarcoplasmic reticulum

Myometrial Relaxation and Contraction

The balance between myometrial relaxation and contraction is controlled by steroid- and peptide-hormone transcriptional regulation of key genes and their protein products.

Quiescence is achieved in part by:

(1) diminished intracellular crosstalk and reduced intracellular Ca levels

(2) ion channel regulation of cell membrane potential

(3) activation of the uterine endoplasmic reticulum stress-unfolded protein response; and

(4) uterotonic degradation.

Contractility results from:

(1) enhanced interactions between the actin and myosin proteins

(2) heightened excitability of individual myometrial cells; and

(3) promotion of intracellular crosstalk that allows synchronous contractions to develop Action-Myosin Interactions. [16]

Related Articles:

Onange S et al. conducted a prospective cohort study to measure the incidence and the risk factors for post-partum hemorrhage in Uganda. They studied 1188 women, overall incidence of PPH was 9% [95% CI 7.5-10.6 %] and of the severe PPH was 1.2% [95% CI 0.6-2.0 %]. LSCS was one of the major risk factors (adjusted odds ratio [aOR] 7.54; 95 % CI 4.11–13.81) and the other factors among all the deliveries were multiple pregnancy (aOR 2.26; 95 % CI 0.58–8.79); fetal macrosomia ≥4000 g (aOR 2.18; 95 % CI 1.11–4.29); and HIV positive sero-status (aOR 1.93; 95 % CI 1.06–3.50). Macrosomia, (aOR 2.14; 95 % CI1.02–4.47); Multiple pregnancy, (aOR 7.66; 95 % CI 1.81–32.34); and HIV positive sero-status (aOR 2.26; 95 % CI 1.20–4.25) were the risk factors involved in women with vaginal deliveries.[27]

A study was done by Premalatha HL et al. to see the association of uterine atonicity and serum calcium levels in Hassan. There were 200 clients in the study. 100 in each of the group. 24 out of 100 women developed atonic PPH amongst who had serum calcium <8mg dl. On contrary only one had atonic PPH among those who had calcium > 8mg/dl. The study revealed that uterine atony is more when serum calcium level is < 8 mg %, compared to serum calcium level > 8 mg % with p value of 0.04 which is statistically significant.[28]

A cohort study was conducted by Oguaka V N et al. with an objective of determining the relationship between serum calcium levels in parturient women and primary PPH. A cohort of 140 parturient mothers were followed up. The results were as follows: 11.4% of the study participants had primary PPH. The mean serum calcium levels of women with PPH were much lesser compared to those without PPH from uterine atony. The conclusion of the study was that hypocalcemia occurred in the women with uterine atonic PPH.[29]

Nickerson CJB conducted the study to investigate the relationship between predelivery serum calcium and blood loss at delivery as reflected by hematocrit values post-delivery. The summary of the results was as follows: predelivery serum calcium had no correlation to blood loss reflected by hematocrit, Haemoglobin and mean corpuscular haemoglobin concentration. While there was significant correlation between the predelivery serum calcium levels and the mean corpuscular volume and mean corpuscular haemoglobin levels.[30]

Yet another similar study conducted by Wilson UMK, studied the relationship between serum calcium levels and blood loss at delivery among the Navajo women. They used analysis of variance to test their hypothesis. The variables tested were serum calcium versus blood loss at delivery. Estimated blood loss at delivery and use of aspirin. There was no association between the variables. Hence the study concluded that there was no relationship between serum calcium levels and blood loss at delivery.[31]

Lisonkova S et al. conducted a case control study to examine the blood loss and risk factors associated with the atonic PPH. A matched case control study was conducted in eight of the tertiary care hospitals. 16.7% of the cases who delivered vaginally and 34.1% of the cases who delivered by LSCS had PPH. PPH was found in the 8.2% of the controls who delivered vaginally and 6.7% of the controls who delivered by LSCS. It was found that the nulliparity and vaginal birth after LSCS were the risk factors for atonic PPH.[32]

Wadhwani R et al conducted a case control study to see the association between serum uric acid and serum calcium with complication of pregnancy. In their study states that the occurrence of the CVA and PPH is higher in women who have serum calcium < 9g/dl. Among the women who had calcium levels <9 mg/dl, 90% of

them had CVA, 63.2% of them had PPH, 90% of them had HELLP. They also studied the association with serum uric acid and found that the occurrence of CVA and PPH is higher in women who have serum uric acid levels < 6.2 mg/dl.[33]

Khan A M et al in their study showed the association between the low serum Vitamin D and uterine atony. The results said that 87% of those who had atony had vitamin D deficiency and 68% had no uterine atony. This difference was statistically significant. The mean serum vitamin D levels in women with atony was 15.9 ng/dl. Serum calcium is associated with the Vitamin D deficiency.[34]

A Randomized controlled trail was conducted by Adb El- Samie M et al. and their objective was to compare the role of Methergine, Misoprostol and Calcium in the management of atonic PPH. 300 women recruited in the study who all received 5 International Units of oxytocin as prophylaxis. Three groups were methergine, misoprostol and calcium. The study concluded that Methergine is more effective in controlling the amount of blood loss during delivery and giving a better chance in prevention of atonic PPH. The study also suggested that calcium can be used in place of methergine as it has lower side effects.[5]

A study was conducted in the Zhengzhou People's hospital to see the clinical efficacy of oxytocin combined with the calcium gluconate in treating the PPH. A total of 198 women were divided into two intervention groups. One received only oxytocin and the other received the oxytocin with calcium gluconate. Their treatment efficiency was compared. 91.9% of the women had effective control of PPH when oxytocin was conducted with calcium gluconate. Mean 2-hour bleeding rate was significantly less in the intervention group. The indices of the oxidative stress were also lower in case of intervention. They concluded that combining calcium gluconate with oxytocin in management of the PPH is effective significantly.[10]

A study of relationship between Serum Calcium levels and the occurrence and severity of PPH was done in Srinagar by Sheema et al. Results of the study showed that 12 out of 50 women developed PPH among who had serum calcium < 8.5mg/dl. Chi-square test showed the significant association between the calcium and PPH. The study also showed that 4 out of 12 women developed major PPH in group with less calcium and no women with normal calcium developed major PPH. The study concluded that low calcium level is strongly associated with increased occurrence of PPH and is a risk factor for PPH**.** Hence, administration of the IV calcium gluconate in second stage of the labor is recommended.[35]

A retrospective cohort study conducted by Epstein D et al. showed the association between ionized calcium and severity of postpartum hemorrhage. It was a cohort study which consisted 436 patients. Results showed that, 51.5% of the hypocalcemia patients had PPH. This difference between the normal calcium levels and hypercalcinemia patients in the occurrence of the PPH was statistically significant. They also tested the performance of fibrinogen in the women with PPH. But there was the no significance in the results. Hence, they concluded that monitoring calcium my help in identifying the high-risk women for preventing the PPH.[8]

A study conducted by the Aruna Rani et al. to assess the effectiveness of the group 1 intravenous methergine, group 2 intra muscular oxytocin and group 3 transrectal misoprostol in the active management of the labor. The results were as follows; use of other uterotonics in the group 1, 2 and 3 were 1%, 6% and 8% respectively. Incidence of were 1% of mild PPH and 2% of the retained placenta in group 1, 2% of the mild PPH in both group 2 and group 3. The study concluded that the oxytocin to be the first line of drug for preventing PPH.[36]

Talati Chiraag et al. conducted a study to see the effect of extracellular calcium on oxytocin – induced contractility in Naïve and oxytocin-Pretreated Human Myometrium in vitro. The study concluded that in oxytocin naïve myometrium normo-calcemic gives better oxytocin induced contractility. Variability of exists in contractility of the myometrium in oxytocin pretreated myometrium.[9]

Edhi M M et al. conducted a study to understand the causes and management of post-partum hemorrhage. It was a cross sectional study with 1493 participants. Most common type of primary PPH was uterine atonic PPH. Retained products of conception was the most common of secondary PPH.[37]

Tort Julie et al. conducted a cross sectional epidemiological survey on factors associated with PPH. A sample size of 3278 was included. Age over 35 years, pre-existing chronic disease during pregnancy, assisted deliveries and baby weight >4000 grams were few high risks for the PPH.[38]

4. MATERIALS AND METHODS

A. Study setting:

The study was conducted in the Department of Obstetrics and Gynecology of KLE's Dr. Prabhakar Kore Charitable Hospital, Belagavi.

B. Study design:

Cohort Study

C. Study population:

Population element: Term pregnant women admitted to the labor room and undergo delivery.

Sampling element: Term pregnant women admitted to the labor room and undergoing delivery at KLE's Dr. Prabhakar Kore Charitable Hospital, Belagavi after meeting the inclusion and exclusion criteria

D. Study period:

Data of those patients was considered who delivered between January 1st, 2020 – April 2021.

E. Sources of data:

Primary source: Information collected from women who delivered in the study setting during the study period.

Secondary source: Secondary source of information such as related books, standard protocols & guidelines, published articles, authenticated web pages, media and other related documents were used to develop the synopsis, proforma and dissertation.

F. Eligibility criteria:

- **Inclusion criteria:**

  i. 1st and 2nd Gravidas

  ii. Both vaginal and cesarean deliveries

  iii. Those who have consented

- **Exclusion criteria:**

  i. Factors which interfere with ability of the uterus to contract:

  - Multiple pregnancies
  - Multiparity
  - Placenta previa
  - Prolonged labor
  - Retained placenta
  - Hydramnios
  - Big baby
  - Abruptio Placenta
  - Anemia
  - Hypotension
  - Gestational Diabetes Mellitus
  - Traumatic PPH
  - Uterine anomalies and bleeding disorders

G. **Sampling procedure**:

Assuming that random sampling and conditions warranting approximate normality of the distribution of p, sample size determination was done using Fleiss JL formula for cohort studies. The formula and function are given below.

Calculate using these formulas (Fleiss JL. 1981. pp. 44-45)

$$m' = \frac{\left[c_{\alpha/2}\sqrt{(r+1)\bar{P}\bar{Q}} - c_{1-\beta}\sqrt{rP_1Q_1 + P_2Q_2} \right]^2}{r(P_2 - P_1)^2}$$

$$m' \left[\quad - \sqrt{\quad \frac{}{2(r+1)} \quad} \right]^2$$

m=n_1=size of sample from population 1 n_2=size of sample from population 2

P_1=proportion of **disease** in population 1 P_2=proportion of **disease** in population 2

α= "Significance" = 0.05 β=chance of not detecting a difference = 0.2

1-β = Power = 0.8 r = n2/n1 = ratio of cases to controls

$\bar{P} = (P_1+rP_2)/(r+1)$ Q = 1-P.

n_1 = m n_2 = rm

From table A.2 in Fleiss;

- If 1- α is 0.95 then $c_{\alpha/2}$ is 1.960
- If 1- β is 0.80 then $c_{1\text{-beta}}$ is -0.842

With

Relative risk of 24, p1 = 1% and p2 = 24% [reference 5] and r= 1, significance = 5% and Power = 80%. The sample size was 32 in each of the exposed and unexposed group. Hence total sample size was 64.

H. Method of data collection:

A cohort of women delivering at KLE's Dr. Prabhakar Kore Charitable Hospital, Belagavi were screened. A total of 400 subjects were recruited in the study after meeting the inclusion and exclusion criteria.

Blood was collected for serum calcium from all the 400 subjects who were in labor. 2ml of venous sample was collected in a Plain vacutainer with all the aseptic precautions. Serum calcium levels were measured using BAPTA method.

Further they were divided into 2 groups

Group A-Serum Calcium <8mg/dl

Group B-Serum Calcium >8mg/dl

Cases of PPH and Uterine atonicity were studied in both the groups

Uterine atonicity was considered when any one of the following is present

1. The uterus is soft, distended and lacking muscle tone, after the delivery of placenta.
2. Administration of more than 1 bolus of oxytocin.
3. Administration of second line uterotonic including Methergine, Carboprost or Misoprostol.
4. Surgical interventions for uterine atony like B- lynch, Hayman sutures, uterine artery ligation.
5. Estimated blood loss of more than 500 ml in vaginal deliveries and more than 1000 ml in cesarean deliveries.
6. Transfusion of blood products during or within 24 hours of delivery.

I. **Exposure ascertainment**:

Serum calcium levels in these women was the exposure of interest. Serum calcium levels of < 8 mg/dl was considered as low calcium levels corresponding to the presence of the exposure and serum calcium levels of > 8 mg/dl was considered as normal calcium levels corresponding to the absence of the exposure.

J. Ethical Considerations:

Ethical clearance was taken from the institutional ethical committee. Ethical Clearance letter is annexed. [Annexure 1]

The four universal ethical principles in biomedical research are followed in the present study, as described in the landmark book-Principles of biomedical ethics by Beauchamp and Childress**.65** They are

a) Respect for autonomy:

The study subjects were explained about the study and prior written informed consent was taken in local language [Kannada] and in English. Only those who gave consent were included in the study.

b) **Beneficence:**

All the participants were explained about the importance of study and assurance was given there will be no breech in the care given if refused to consent for the study.

c) **Nonmaleficence:**

The patient will not be exposed to any additional risk as a result of this study. Due care was taken to protect the privacy of the study subjects. Confidentiality of the information collected was maintained.

d) **Justice:**

Due care was taken while recruiting the participants. Fairness and Equity was maintained in selecting the study participants.

K. Statistical analysis:

Data collected was entered in Microsoft excel and analysed in R software. Data were presented using mean and standard deviations for continuous data and frequencies and percentages for categorical data. Suitable graphs were used for the same.

For univariate analysis was done to test the hypothesis. Chi-square test was used for categorical data. Student't test was used for numerical data. Relative risk was calculated for the risk assessment. Regression was done for bivariate analysis, which assess the strength of association of the factors predicting the outcome. Adjusted odd's ratio was calculated for the predictors. For all the tests the value of p less than 0.05 [$\alpha = 5\%$] was considered significant.

5. RESULTS

Table 5.1: Age [in years] of the study participants. [n-400]

Age in years	Mean	Standard Deviation
Serum Calcium <8 mg/dl	25.61	3.94
Serum Calcium ≥ 8 mg/dl	24.53	3.69

Figure 5.1: Age of the study participants.

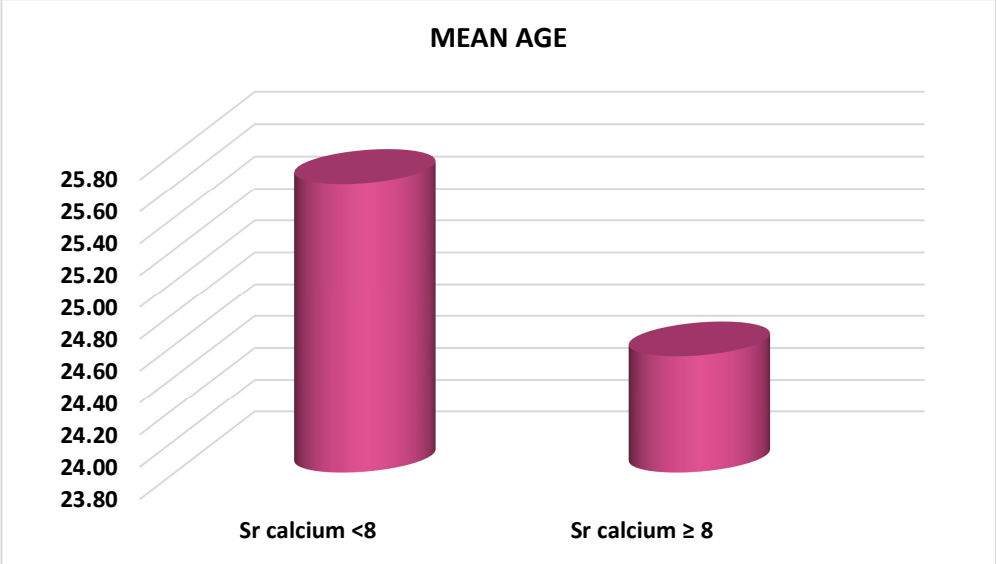


Table 5.1 shows the age among study participants. The mean age of the study participants in those with calcium < 8mg/dl is 25.61 years and those with calcium level > 8mg/dl is 24.53 years. Both the groups i.e., exposed [Serum calcium <8mg/dl] and non-exposed [Serum calcium >8mg/dl] are comparable with respect to age. It can be said that group matching of the groups with respect to age had been achieved.

Table 5.2: Gestational Age among the study participants. [n-400]

Gestational Age in weeks	Mean	Standard Deviation	p-value*
Serum Calcium <8 mg/dl	38.7	1.3	0.71
Serum Calcium ≥ 8 mg/dl	38.6	2.1	

*-Student's unpaired t test was used.

Figure 5.2: Gestational Age [in weeks] of the study participants

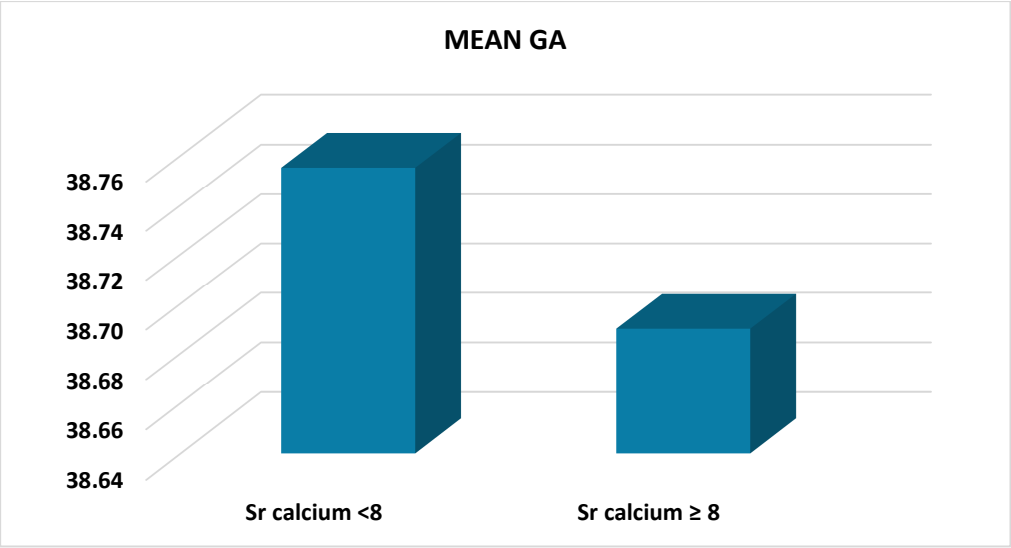


Table 5.2 shows the gestational age among the study participants. The mean gestational age of the study participants in those with calcium < 8mg/dl is 38.76 weeks and those with calcium level > 8mg/dl is 38.69 weeks. There is no significant difference in the gestational age between the groups.

Table 5.3: Association between Gravida of the study participants and their serum calcium levels.

	Serum calcium levels		TOTAL	p-value*
Gravida	**<8 mg/dl**	**≥ 8 mg/dl**		
One	34	195	229	0.466
Two	30	141	171	
TOTAL	64	336	400	
*-Chi square test for testing the hypothesis				

Association between the Gravida of the women and serum calcium is depicted in the above table. 34 women out of 64 women with serum calcium levels < 8mg/dl and 195 women out of 336 women with serum calcium levels > 8mg/dl were first gravida .30 women out of 64 women with serum calcium levels <8mg/dl and 141 women out of 336 women with serum calcium levels > 8mg/dl were second gravida. There is no association between the gravidity of the women and serum calcium levels. There is no statistical significance. [p=0.466] tested using Chi-square test for testing the hypothesis.

Table 5.4: Association between Mode of Delivery among the study participants and their serum calcium levels.

	Serum calcium levels		TOTAL	p-value*
Mode of Delivery	**<8 mg/dl**	**≥ 8 mg/dl**		
Vaginal	32	146	178	0.334
LSCS	32	190	222	
TOTAL	64	336	400	
*-Chi square test for the testing the hypothesis				

Association between the Mode of Delivery and serum calcium is depicted in the above table. 32 out of 64 women with serum calcium levels < 8mg/dl and 146 out of 336 women with serum calcium levels > 8mg/dl delivered vaginally and 32 women out of 64 women with serum calcium levels <8 mg/dl and 190 women out of 336 women with serum calcium levels > 8 mg/dl delivered by LSCS. There is no association between the Mode of Delivery of women and the serum calcium levels. There is no statistical significance. [p=0.334] tested using Chi-square test for testing the hypothesis

Table 5.5: Distribution of the study participants according to the cohorts*.[n=400]

*Cohorts are Serum calcium levels <8mg/dl and Serum calcium levels >8mg/dl

	Frequencies	Percentages
Serum calcium levels <8mg/dl	64	16
Serum calcium levels >8mg/dl	336	84
Total	400	100

Figure 5.3: Serum calcium levels among the study participants

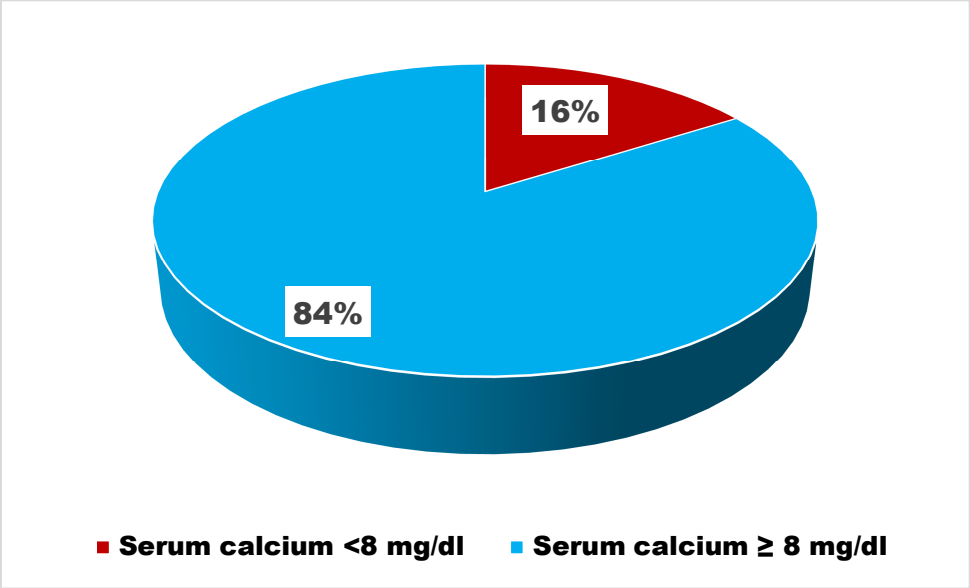
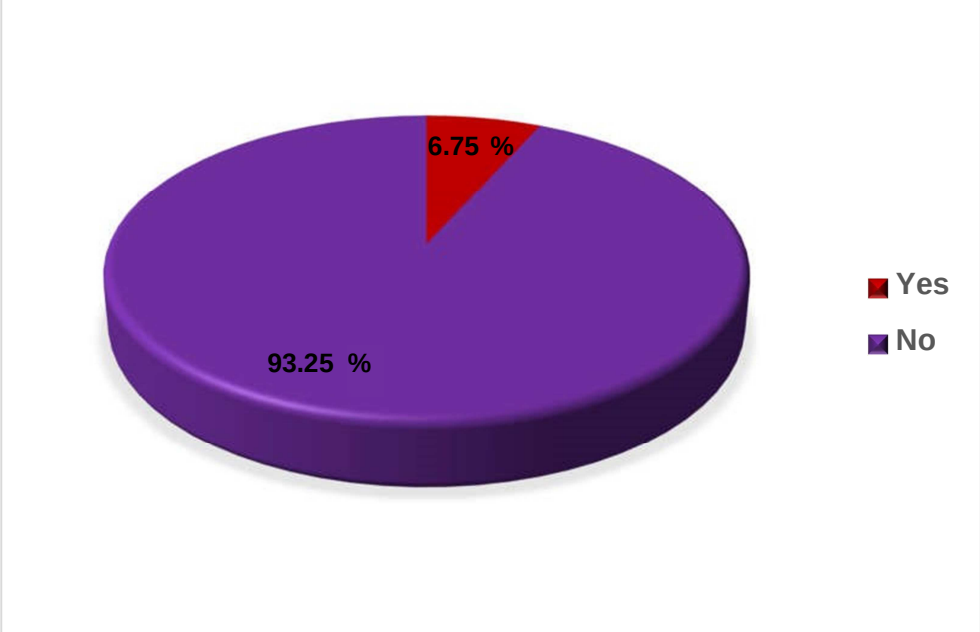


Table 5.4 depicts the serum calcium levels of the study participants. Low serum calcium i.e., < 8 mg/dl is seen in 16 % of them. While 84% of them have calcium levels > 8 mg/dl

Table 5.6: Prevalence of PPH among the study participants. [n=400]

PPH	Number	Percentage
Yes	27	6.75
No	373	93.25
TOTAL	400	100.00

Figure 5.4: Prevalence of PPH among the study participants.



In the present study, the prevalence of the occurrence of the post-partum hemorrhage was 6.75%. 93.25% of the study participants did not have PPH. This data is depicted in the above given table and figure.

Table 5.7: Association between Atonic PPH and serum calcium levels . [n=400]

	Atonic PPH Frequencies [Percentages*]		Chi square test p-value
	Yes	No	
Serum calcium levels <8mg/dl	16 [59.26]	48 [12.87]	**<0.0001**
Serum calcium levels >8mg/dl	11 [40.74]	325 [87.13]	
Total	**27 [100]**	**373 [100]**	

*Numbers in the parenthesis indicate column percentages.

As per the objective of the study, the results of the association between the PPH and serum calcium is depicted in the above table. 16 out of 64 women with serum calcium levels < 8mg/dl had PPH, however only 11 out of 336 women with serum calcium levels > 8mg/dl had PPH. As we can observe that PPH is lesser among those with higher serum calcium levels. 59.26% of those who suffered from PPH had Serum calcium levels <8mg/dl.

The association between the occurrence of PPH and serum calcium levels is not by chance but is a truth because this difference is statistically significant. [p<0.0001] tested using Chi-square test for testing the hypothesis.

Table 5.8: Relative Risk of Atonic PPH. [n=400]

Incidence of PPH among serum calcium <8mg/dl	25%
Incidence of PPH among serum calcium >8mg/dl	3.27%
RELATIVE RISK [RR]	**7.66**

Relative risk of the women with serum calcium <8mg/dl for having atonic PPH is 7.66. Meaning 3.27% of the women who had serum calcium levels >8mg/dl had PPH, while 25% of those with serum calcium levels <8mg/dl had PPH. So, women with serum calcium levels <8mg/dl have 7.66 times higher risk for PPH compared to women with serum calcium levels >8mg/dl.

Table 5.9: Mean Blood Loss [in ml] among the study participants. [n-400]

Mean Blood Loss [in ml]	Mean	Standard Deviation	Minimum	Maximum	P value*
Serum Calcium <8 mg/dl	550.77	169.60	150	1050	<0.0001
Serum Calcium ≥ 8 mg/dl	366.22	152.40	100	890	
*-Student's unpaired t test was used to test the hypothesis					

Figure 5.5: Mean Blood Loss [in ml] among the study participants.

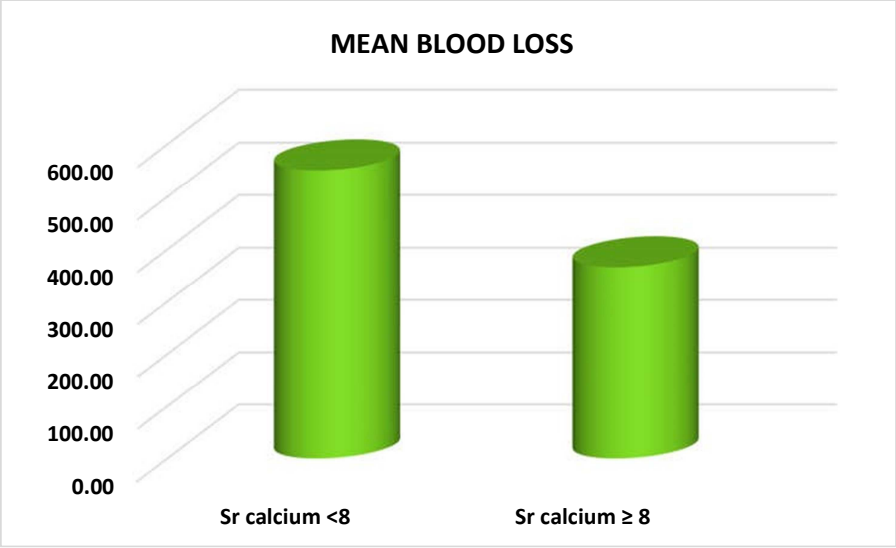


Table 5.9 shows that mean blood loss among the those with calcium > 8mg/dl [mean = 366.22 ml] is much lesser than those having the calcium < 8 mg/dl [mean= 550.77 ml]. It clearly indicates that normal calcium levels are associated with lesser blood loss during delivery. This association is statistically significant with p-value <0.0001.

Table 5.10: Amount of Blood [in ml] loss according to mode of delivery. [n=400]

Serum Calcium levels	Mode of Delivery	Mean	SD
		In millilitres of blood	
Serum calcium levels <8mg/dl	Vaginal Delivery	466.3	135.5
	LSCS	635.3	159.2
Serum calcium levels >8mg/dl	Vaginal Delivery	259.0	131.5
	LSCS	447.6	111.6

SD- Standard Deviation

The amount of blood loss during labor is being presented in the above table. Amongst the women with serum calcium level <8mg/dl, there was blood loss of 466.3 ml following vaginal delivery and 635.3 milliliters of blood loss following LSCS. Woman with serum calcium levels >8mg/dl had 259.0 milliliters of blood loss after vagina delivery and 447.6 ml after LSCS. We can observe that amongst vaginal delivery or LSCS, woman with serum calcium level <8mg/dl, had higher amount of blood loss during labor

Table 5.11: Difference in the amount of blood loss.

Mean Blood Loss in ml **Mean [SD]**	Vaginal Delivery	P-value*	LSCS	P-value*
Serum calcium levels <8mg/dl	466 [135]	**<0.0001**	635 [159]	**<0.0001**
Serum calcium levels >8mg/dl	259 [131]		448 [112]	

SD- Standard Deviation *- Student's unpaired t test was used.

On comparing the blood loss occurred during delivery, in between the exposed and unexposed group, it was found that in the category of vagina delivery 466 ml of blood loss was observed among the exposed while, only 259 ml of blood loss was observed among unexposed. This difference in the amount of blood loss tested using students t test, showed that p-value was <0.0001 which means there is significant difference in the amount of blood loss between the two groups. Similarly, blood loss in LSCS was also significantly different between the two groups.

Table 5.12: Additional Uterotonics in the management of Uterine Atonicity and PPH. [n=400]

	Uterotonics Frequencies [Percentages*]		Chi square test p-value
	Yes	No	
Serum calcium levels <8mg/dl	54 [38.57]	10 [3.85]	**<0.0001**
Serum calcium levels >8mg/dl	86 [61.43]	250 [96.15]	
Total	**140 [100]**	**260 [100]**	

*Numbers in the parenthesis indicate column percentages.

As per the objective of the study, the results of the association between the use of additional uterotonics for managing the uterine atonicity ,PPH and serum calcium is depicted in the above table. Among 64 women with serum calcium levels < 8 mg/dl , in 54 women additonal dose of uterotonics were used.Among 336 women with serum calcium levels > 8mg/dl ,only in 86 additional uterotonics were used. For 10 women out of 64 women with serum calcium levels < 8 g/ and 250 women out of 336 women with serum calcium levels > 8mg/dl additional uterotonics were not used. This association between the use of additional uterotonics for managing the uterine atonicity and PPH and serum calcium levels is not by chance but is a truth because this difference is statistically significant. [p<0.0001] tested using Chi-square test for testing the hypothesis.

Table 5.13: Surgical intervention in the management of Uterine Atonicity and PPH. [n=400]

	Surgical intervention Frequencies [Percentages*]		Chi square test p-value
	Yes	No	
Serum calcium levels <8mg/dl	15 [55.56]	49 [13.14]	**<0.0001**
Serum calcium levels >8mg/dl	12 [44.44]	324 [86.86]	
Total	**27 [100]**	**373 [100]**	

*Numbers in the parenthesis indicate column percentages.

As per the objective of the study, results of the association between surgical intervention for managing the uterine atonicity and PPH and serum calcium is depicted in the above table. Among 15 out of 64 women with serum calcium levels < 8 mg/dl and 12 out of 336 women with serum calcium levels > 8mg/dl, surgical intervention was required. For 49 out of 64 women with serum calcium levels < 8 mg/dl and 324 out of 336 women with serum calcium levels > 8mg/dl surgical intervention was not required. The association between the use of surgical intervention and serum calcium levels is not by chance but is a truth because this difference is statistically significant. [$p<0.0001$] tested using Chi-square test for testing the hypothesis.

Table 5.14: Pre-delivery Hemoglobin among the study participants. [n-400]

Hemoglobin in g/dl	Mean	Standard Deviation	p-value*
Serum Calcium <8 mg/dl	11.81	1.27	0.046
Serum Calcium ≥ 8 mg/dl	12.16	1.28	

*-Student's unpaired t test was used.

Figure 5.6: Pre-delivery Hemoglobin among the study participants.

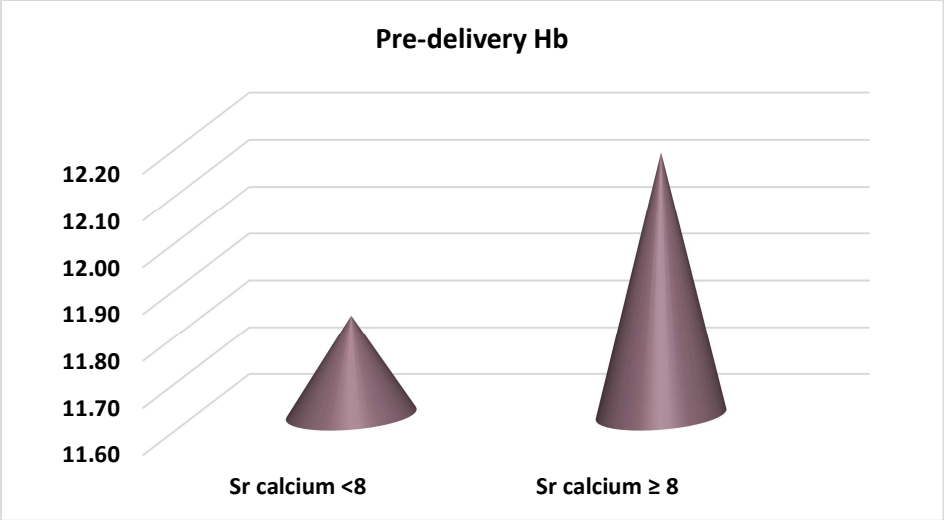


Table 5. 14 shows the Hemoglobin levels among the study participants before delivery The mean Hemoglobin level of the study participants before delivery in those with calcium < 8mg/dl is 11.81 g/dl and those with calcium level > 8mg/dl is 12.16 g/dl. There is no much significant difference in the hemoglobin levels between the groups.

Table 5.15: Post-delivery Hemoglobin among the study participants. [n-400]

Hemoglobin in g/dl	Mean	Standard Deviation	p-value*
Serum Calcium <8 mg/dl	9.72	1.25	0.046
Serum Calcium ≥ 8 mg/dl	11.11	1.90	

*-Student's unpaired t test was used.

Figure 5.7: Post-delivery Hemoglobin among the study participants.

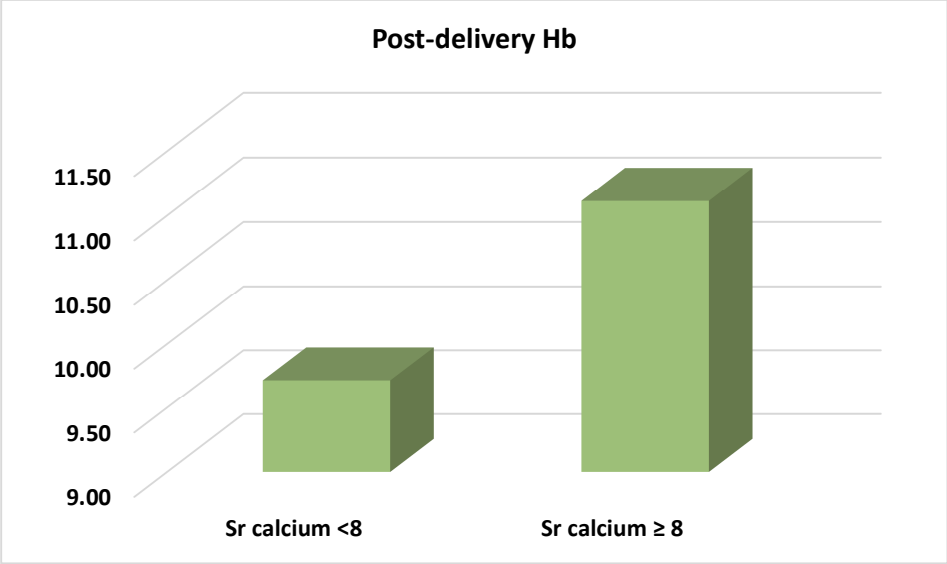


Table 5.15 shows the Hemoglobin levels measured after the delivery among the study participants. The mean Hemoglobin level of the study participants measured after delivery, in those with calcium < 8mg/dl is 11.81 mg/dl and those with calcium level > 8mg/dl is 12.16 mg/dl. There is significant difference in the hemoglobin levels between the groups. The decrease in the hemoglobin measured after the delivery among women with serum calcium <8mg/dl is by 2.08g/dl, where as in women with serum calcium >8 mg/dl the decrease is 1.08g/dl which is statistically significant with p value <0.0001.

6. DISCUSSION

The results of our study conducted on the association between the serum calcium levels and uterine Atonicity and PPH will be discussed under relevant sections.

Age Distribution:

The mean age of the study participants of the present study, in those with calcium < 8mg/dl is 25.61 years and those with calcium level > 8mg/dl is 24.53 years. Nickerson CJB et al. shows similar age distribution of the age with mean age being 23.06 years in the Navajo women.[30] Similarly, another study conducted by Wilson UMK et al showed that 34.3% of their participants belonged to the age group of 21-24 years, while 25-28 years women composed 17.3%.[31] Khan SM et al. study on uterine atony and low serum vitamin D levels had mean age of the study participants as 25 years.[34] Oguaka V N et al. studied the effect of serum calcium in primary hemorrhage. 72.5% of their study participants belonged to age group > 25 years.[29] Their study population is much older compared to our study.

Obstetric Indices:

The mean gestational age of our study participants those with calcium < 8mg/dl is 38.76 weeks and those with calcium level > 8mg/dl is 38.69 weeks. 56 women out of 64 women with serum calcium levels < 8mg/dl and 226 women out of 336 women with serum calcium levels > 8mg/dl were Abortion zero; 8 women out of 64 women with serum calcium levels <8mg/dl and 110 women out of 336 women whose serum calcium levels > 8mg/dl were Abortion one. There was no significant association between the Obstetric Index- Gravida, living, abortion of the women and their serum calcium levels or PPH.

Wilson UMK et al. study showed that, the mean gestational age was 38-43 weeks. These results are slightly higher compared to our study. This could be attributed to the genetic difference between women in our study and the Navajo women.[31] Khan SM et al. presents that the mean gestational age in their study participants was 37 weeks.[34]

Serum calcium levels:

In the present study, Low serum calcium i.e., < 8 mg/dl is seen in 16 % of the study participants While 84% of them have calcium levels > 8 mg/dl.

Wilson UMK et al. study shows that women in their study 48.5% of their women had low serum calcium levels < 8.5 mg/dl.[31] Khan SM et al. study showed that 87% of the uterine atony women had vitamin D deficiency which can be a proxy indicator for the calcium deficiency.[34] Oguaka V N et al presents that 46.4% of their study women had hypocalcemia. This is much higher compared to present study.[5]

Table 6.1: Discussion on Serum Calcium levels.

OUR STUDY	Wilson UMK et al.[31]	Khan SM et al.[34]	Oguaka V N et al.[5]
16% had low serum calcium levels	48.5% low calcium levels	87% deficiency had uterine atony	46.4% low calcium levels

Post-partum Hemorrhage:

In the present study, the prevalence of the occurrence of the post-partum hemorrhage was 6.75%. 93.25% of the study participants did not have PPH. 16 women out of 64 women with serum calcium levels < 8mg/dl had PPH, however only 11 women out of 336 women with serum calcium levels > 8mg/dl had PPH. PPH is lesser among those with higher serum calcium levels. Our study shows significant [p-

value < 0.0001] association between the occurrence of PPH and lower serum calcium levels.Relative risk of the serum calcium <8mg/dl for having atonic PPH is 7.66. Meaning 3.27% of the women with serum calcium levels >8mg/dl had PPH, while 25% of those with serum calcium levels <8mg/dl had PPH. So, women who have serum calcium levels <8mg/dl have 7.66 times higher risk for PPH compared to women with serum calcium levels >8mg/dl

Premalatha HL et al. in their study presented that relative risk as high as 24. That is women with serum calcium levels <8mg/dl had 24 times higher risk for PPH compared to women with serum calcium levels >8mg/dl. [28]

Premalatha HL et al. showed that, 24 out of 100 women who had serum calcium levels < 8 mg/dl had atonic PPH. There was significant association between the two variables.[28] These findings are consistent with our study.

According to, Oguaka V N et al prevalence of PPH in their study was 11.4% which is higher than our study. Although the [prevalence of PPH is higher in the study conducted by Oguaka V N et al, there is similarity with respect to the significant association between the low calcium levels and atonic PPH in both the studies.[5]

Similar results are shown by Seema et al. in their study, that 12 out of 50 women with calcium < 8.5 mg/dl had PPH. The study showed significant association between the PPH and serum calcium levels. 4 out of 12 women had severe PPH.[35]

Samie Abd El et al. showed that the administration of calcium reduced the volume of blood loss during PPH. There was significant association between them. Tonicity of the uterus after labor was much higher in women, who were given calcium.[29]

Table 6.2: Discussion on Post- Partum Hemorrhage.

Prevalence of PPH					
OUR STUDY	Premalatha HL et al.[28]	Oguaka V N et al.[5]	Edhi MM et al. [37]	Seema et al.[35]	Samie Abd El et al.[29]
25% (16 out of 64 women)	24 out of 100 women	11.4%	6%	12 out of 50 women	Lesser in women with calcium administration
All the studies have shown significant association between the lower serum calcium levels and PPH					

Amount of Blood Loss:

The mean blood loss among the women with calcium > 8mg/dl [mean = 366.22 ml] is much lesser than those having the calcium < 8 mg/dl [mean= 550.77 ml] in our study.

Amongst the women who had calcium level <8mg/dl, had blood loss of 466.3 ml after vaginal delivery and 635.3 ml after LSCS. Woman who had serum calcium levels >8mg/dl had 259.0 ml of blood loss after vaginal delivery and 447.6 ml of blood loss after LSCS.

It can be inferred that irrespective of the mode of the delivery lower levels of serum calcium levels is a higher risk factor for atonic PPH.

Wilson UMK et al. showed that the mean blood loss among their study population was 652.1 ml. which is higher than our study.[31] Khan SM et al. presents a higher amount of blood loss i.e., 1032 ml compared to our study.[34] Amount of blood loss contributes to the lower serum calcium levels which causes uterine atonicity.

Table 6.3: Mean Blood Loss in hypocalcemic women.

Mean Blood Loss in ml		
OUR STUDY	Wilson UMK et al.[31]	Khan SM et al.[34]
550.77 ml	652.1 ml	1032 ml

Management of PPH:

Among 54 women out of 64 women with serum calcium levels < 8 mg/dl and 86 women out of 336 women with serum calcium levels > 8mg/dl additional uterotonics were used. There is significant association between the use of uterotonics for managing the PPH and lower serum calcium levels. Among 15 women out of 64 women with serum calcium levels < 8 mg/dl and 12 women out of 336 women with serum calcium levels > 8mg/dl, surgical intervention was used. The association between the use of surgical intervention for managing the PPH and lower serum calcium levels is significant.

Samie Abd El et al. showed that there is 30% reduction in the use of additional uterotonics and blood transfusion if calcium was used in the management of the third stage of labor. [4]

Although there are few variations in the results of the various studies, more or less conclusion of all the studies is consistent with our study results.

7. CONCLUSION

Women with hypocalcemia are at a higher risk of developing uterine atonicity and PPH as compared to eucalcemic women. Additional use of oxytocics, surgical intervention used and the mean blood loss was higher in women with lower calcium levels in comparison to women with normal calcium. There was also a significant decrease in the hemoglobin level after delivery among these women. Hence, Administration of IV Calcium Gluconate in addition to the uterotonics can be of help to reduce Atonic PPH especially in high risk women to reduce the burden of maternal morbidity and mortality.

8. SUMMARY

Postpartum hemorrhage is the leading cause of maternal death in low-income countries and is the primary cause of approximately one-third of global maternal deaths. Uterine atony is the most common cause of PPH leading to maternal morbidity and mortality. Uterine atony is mainly due to the failure of myometrial contractile system, which in turn depends on the calcium ions. Calcium plays a very important role in the uterine smooth muscle contraction and hence reducing the burden of hemorrhage.

A cohort of women delivering at KLE's Dr. Prabhakar Kore Charitable Hospital, Belagavi were screened. A total of 400 subjects were recruited in the study after meeting the inclusion and exclusion criteria. Blood was collected for serum calcium from all the 400 subjects who were in labor. Further they were divided into 2 groups of Serum Calcium <8mg/dl and Serum Calcium >8mg/dl. Cases of PPH and Uterine atonicity were studied in both the groups . 16% (64 out of 400) of women had serum calcium <8mg/dl and 84% (336 out 400) had serum calcium >8mg/dl.

In the present study, the prevalence of the occurrence of Post-partum hemorrhage was 6.75%. 16 out of 64 women (25%) with serum calcium levels < 8mg/dl had PPH, however only 11 out of 336(3.27%) women with serum calcium levels > 8mg/dl had PPH. PPH is lesser among those with higher serum calcium levels.

Relative risk of the women with serum calcium <8mg/dl for having atonic PPH is 7.66.

In our study, 59.26% of those who suffered from PPH had Serum calcium levels <8mg/dl.

Uterine atonicity and PPH were more in the women with serum calium levels <8mg/dl which required additional uterotonics and surgical intervention for their management.

There was also increase in the amount of bood loss during delivery in women with lower calcium levels and a significant decrease in the hemoglobin level after delivery among these women. Women with hypocalcemia are at a higher risk of developing uterine atonicity and PPH as compared to eucalcemic women. Hence, Administration of IV Calcium Gluconate in addition to the uterotonics can be of help to reduce Atonic PPH especially in high risk women to reduce the burden of maternal morbidity and mortality.

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ANNEXURE - I - ETHICAL CLEARANCE

K.L.E. ACADEMY OF HIGHER EDUCATION AND RESEARCH
(Deemed – to- be- University)
Accredited 'A' Grade by NAAC (2nd Cycle) Placed in Category 'A' by MHRD (GoI)
JAWAHARLAL NEHRU MEDICAL COLLEGE,
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Fax No. +91 (0)831 – 2470759

Ref: MDC/DOME/ 166 **Date: 24/12/2019**

To,

REG. NO. BJ0119015

PG student in Obstetrics & Gynecology,
J.N.Medical College,
BELAGAVI.

Sub: Institutional Ethical Clearance for the study.

With reference to the above, we wish to inform you that your proposed research project titled **"PROSPECTIVE STUDY OF ASSOCIATION OF UTERINE ATONICITY AND PPH WITH SERUM CALCIUM LEVELS",** is ethical and justifiable. The proposed research project has been cleared by the JNMC Institutional Ethics Committee on Human Subjects Research.

(Dr. Anita Dalal)
Member Secretary
JNMC Institutional Ethics Committee
on Human Subjects Research,
J.N.Medical College, Belagavi.

(Dr. Roopa M Bellad)
Chairman,
JNMC Institutional Ethics Committee
on Human Subjects Research,
J.N.Medical College, Belagavi.

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ANEXXURE II- CONSENT FORM

Purpose of the study

I have been informed by **REG. NO. BJ0119015**, Post Graduate in M.S. Obstetrics and Gynaecology under the guidance of Dr._____, Department of Obstetrics and Gynaecology, J.N. Medical College, KLE University, Belagavi is conducting a study to determine the Association between serum calcium levels with uterine atonicity and PPH, **at KAHER's Dr.Prabhakar Kore Hospital, Belagavi.**

Postpartum hemorrhage is the leading cause of maternal death in low income countries and is the primary cause of approximately one-third of global maternal deaths. Uterine atony is the most common cause of PPH leading to maternal morbidity and mortality. The contractile system of involves the interaction of my filaments, Actin and Myosin. The cross bridge formation and contraction is mediated by elevated calcium and myosin light chain phosphorylation. Irrespective of the triggering stimulus, calcium elevation is essential for contraction. Agents like prostaglandin F2alpha and oxytocin that promote contraction act on myometrial cells to increase intracellular cytosolic calcium concentration .Or they allow an influx of extracellular calcium through ligand or voltage regulated calcium channels. Hence it is very important to maintain optimum levels of calcium for the effective uterine contraction.

Study procedure:

Once I have signed the informed consent form, the personal details like name, age, place, address, my education, my health, reproductive history and other

information will be noted down. Serum calcium levels will be sent. The reports will be noted and I will be followed up.

Potential Risks

There are no observable risks associated with the study.

Financial incentive for participation

I will not receive any payment for taking part in this research study.

Privacy

To protect my privacy, all the collected information will be given a number rather than using my name. Any information collected during the study will remain confidential. My medical files will be reviewed only at the hospital (or study doctor's office) to check the information and verify the result without breaking my confidentiality. Only de-identified information on my pregnancy will be shared so as to learn the results of the study.

Authorisation to publish results

The information about me will be analysed together with other study participants. Results of this study will be published and presented to scientific groups for scientific purposes, but I will never be individually identified in the presentation of the study results.

Institutional Policy

In case I have any questions related to the study, in future or in case of study related injury or illness, I can contact **REG. NO. BJ0119015**, Department of

Obstetrics and Gynecology, KAHER, J.N Medical College, Ph. No. _____ or Ph. No: _____or Dr.M.C.Metgud, Professor, Dept. Of Obstetrics and Gynecology, KAHER, J.N Medical College, Belagavi Ph No: _____ or Ph. No: _____.

Voluntary Participation

My participation in the study is voluntary. In case I need any further information regarding my rights as study participant, I may contact Dr. Roopa M Bellad, Professor of Paediatrics, as Chairman of J. N. Medical College Institutional Ethics Committee on Human Subjects Research, Phone No.0831 2473777 ext-1527 at J. N. Medical College, Belagavi. My doctor will take care of me during this pregnancy or in the future. I am free to stop participation in this study at any time and for any reason.

I have read the consent form or the consent form has been read to me. I understand the consent and the signature or sign below confirms that I agree to participate in this study (The participant will receive a copy of this form.)

Study identification number: | | | | |

Signature or thumbprint of participant _____ Date:

PROFORMA

Screening number: ☐☐☐

Date of screening (dd-mm-yyyy): ☐☐ - ☐☐ - ☐☐☐☐

First name: _____ Middle name: _____ Last name: _____

Age (years): ☐☐

IP number: ☐☐☐☐☐☐

Husband's name: _____

Address: House number-_____

Street _____

Taluk _____

Data collection instrument

Enrollment number: ☐☐☐

I. **Socio demographic information**:

1. How old are you? ☐☐ (years)

II. **Present pregnancy**

1. What was the last day of your menstrual cycle? ☐☐ ☐☐ - ☐☐☐☐

d d m m y y y y

2.Were your cycles regular? ☐

1= yes

2=no

3=don't know

3. Estimated date of delivery (EDD) by LMP

☐☐ ☐☐ ☐☐☐☐

4. Corrected Estimated date of delivery(EDD) if any

☐☐ - ☐☐ - ☐☐☐☐

5. Gestational age as per corrected EDD- ☐☐ weeks ☐ days ☐

6. Obstetric score :

Gravida: ☐

Para: ☐

Living: ☐

Abortion: ☐

Stillbirth: ☐

7. Haemoglobin level (gm /dl) : _____. _____

.

(Pre delivery). (Post delivery)

8.Serum calcium level (mg %) –

9.Mode of delivery-

1.-Vaginal – YES ☐ NO ☐

2.LSCS – YES ☐ NO ☐ (I -)

10.Blood loss — _____ ml

11. Pregnancy outcome-	YES	NO
1. The uterus is soft, distended and lacking muscle tone, after the delivery of placenta	☐	☐
2. Administration of more than 1 bolus of oxytocin	☐	☐
3. Administration of a second line uterotonic including methergine, carboprost or misoprostol	☐	☐
4. Surgical interventions for uterine atony like B- lynch or haymann sutures	☐	☐
5. Estimated blood loss of more than 500 ml in vaginal deliveries	☐	☐
6. Estimated blood loss of more than 1000 ml in cesarean deliveries	☐	☐
7. Transfusion of blood products during or within 24 hours of delivery	☐	☐
8. Post delivery Haemoglobin (g%)	☐	☐

SL 2	IP 2	Age	Gravida	Para	Living	Abortion	GA	Sr calcium	Pre delivery Hb	Post delivery Hb	Mode of delivery	Blood loss	PPH	Uterotonics	Surgical intervention
1	1005070	20	1	0	0	0	39.57	8.9	10.9	9.2	2	280	2	1	2
2	1005256	21	1	0	0	0	37.57	9.1	13.1	11.5	1	150	2	2	2
3	1005529	23	2	1	1	0	39.14	8.6	11.7	11	1	200	2	1	2
4	1005735	21	1	0	0	0	38.85	8.9	12.7	11.8	1	240	2	2	2
5	1005746	26	2	1	1	0	37.28	8.9	10.4	9.8	1	350	2	1	2
6	1005857	25	1	0	0	0	39.42	8.4	8.4	9.8	1	700	1	1	2
7	1006067	23	1	0	0	0	36.14	8.8	11.9	10.8	1	300	2	2	2
8	1006781	29	1	0	0	0	39.85	8.8	12.7	11.3	2	350	2	2	2
9	1006571	20	1	0	0	0	38.71	8.7	12.2	10.7	2	550	2	1	2
10	1007106	20	1	0	0	0	40.57	8.6	12.3	10.7	2	220	2	2	2
11	998002	21	1	0	0	0	40	9	11.2	10.5	2	450	2	2	2
12	1008089	24	1	0	0	0	39.42	9.5	13.2	11.2	1	510	1	1	2
13	1008076	23	2	1	1		37.57	9.2	10.5	9.7	2	390	2	2	2
14	1008648	25	1	0	0	0	39.42	8.7	10.7	10.2	1	350	2	2	2
15	1008642	23	2	1	1	0	39	9.1	12.4	10.1	1	260	2	2	2
16	1008695	22	1	0	0	0	40.57	9	12.8	11.1	2	480	2	2	2
17	1010549	20	1	0	0	0	40	8.7	11.9	10.3	2	410	2	2	2
18	1010560	27	1	0	0	0	38	8.6	11.6	9.8	1	530	1	1	2
19	1010871	24	2	0	0	1	39.28	8.8	13.2	12.6	1	250	2	2	2
20	1011684	28	1	0	0	0	41	8.2	10.3	9.5	1	300	2	2	2
21	1011647	21	2	1	1	0	42	8	15.9	11.4	2	890	2	1	1
22	5527901	30	2	1	1		39.71	9.5	12.5	11.3	2	400	2	2	2
23	1011678	24	2	0	0	1	37.57	7.6	10.2	9.9	2	360	2	2	2
24	1012008	23	1	0	0	0	39.28	8.1	13	11.8	1	200	2	2	2
25	1012068	31	1	0	0	0	40	8.2	10.2	9.6	2	480	2	1	2
26	1011961	26	1	0	0	0	40.28	8.7	11.6	10.1	2	300	2	2	2
27	1012188	30	1	0	0	0	40	8.8	12.4	11.1	2	360	2	2	2
28	1015476	21	2	0	0	1	40	7.9	11.8	9.8	1	380	2	1	2
29	1015551	20	1	0	0	0	35.57	8.4	13	12.9	2	300	2	2	2
30	1015559	25	1	0	0	0	40.57	8.3	10.6	9.8	2	600	2	2	2
31	1015599	21	1	0	0	0	39.71	8.7	13.1	12.4	1	150	2	2	2
32	1015653	30	2	1	1	0	37.85	7.7	14.6	13.4	2	520	2	2	2
33	1015923	19	2	0	0	1	39.42	8.8	13	11.9	1	250	2	2	2
34	1015936	23	1	0	0	0	35.14	7.3	10.1	8.7	2	400	2	1	2
35	1016186	26	1	0	0	0	39.28	8.4	13.2	12.2	1	200	2	2	2
36	1016115	22	1	0	0	0	38.85	8.4	13.4	10.7	2	300	2	1	2
37	1016345	22	2	0	0	1	39.71	8.2	14.6	14	1	250	2	2	2
38	5504858	23	2	1	1	0	40.14	7.9	12.6	11	1	150	2	1	2
39	1016954	25	1	0	0	0	40	8.5	13.5	10.8	2	500	2	2	2
40	1016931	22	1	0	0	0	40	8.6	13.2	11.8	1	150	2	2	2
41	1017079	25	1	0	0	0	39	7.1	11.7	10.7	1	300	2	2	2
42	1016682	29	2	1	1	0	37.57	7.9	11	10.6	2	350	2	1	2

43	1016705	32	1	0	0	0	37	8.3	12.1	11.3	1	400	2	2	2
44	1015456	23	2	1	1	0	40.28	8.2	12.1	11	2	380	2	2	2
45	1015282	20	1	0	0	0	39.28	8.9	12	11	2	400	2	2	2
46	1015114	24	1	0	0	0	37.71	9	13.2	12	2	390	2	2	2
47	1014777	28	1	0	0	0	39	8.5	11.8	11.2	1	150	2	2	2
48	1017859	28	2	1	1	0	38.28	8.7	12.1	10.8	1	120	2	2	2
49	1017832	32	2	1	1	0	40	8	12.2	10.8	2	450	2	2	2
50	1017773	19	1	0	0	0	40.57	8.7	12.6	11.7	1	150	2	2	2
51	1018545	27	1	0	0	0	39.71	7.6	11.6	8.9	1	900	1	1	2
52	1018633	27	2	1	1	0	36.42	9	13.6	12.8	2	360	2	2	2
53	1020118	20	1	0	0	0	40.14	8.2	12.1	10.5	1	150	2	2	2
54	1020173	23	1	0	0	0	38.28	8.9	12.2	10.7	2	250	2	2	2
55	1020997	26	2	1	1	0	38.42	8	13.2	10.8	2	400	2	2	2
56	1020178	23	1	0	0	0	41.85	8.5	13.9	13.5	2	450	2	2	2
57	1021076	25	2	1	1	0	38.28	8.8	13.3	11.5	1	150	2	2	2
58	1021069	23	1	0	0	0	35.28	7.2	13.3	11.5	2	540	1	1	2
59	1021103	36	1	0	0	0	37.28	8.2	13	12.3	2	250	2	2	2
60	1021130	30	2	1	1	0	39.71	8.1	11.2	10.8	2	390	2	2	2
61	1021152	24	1	0	0	0	40.57	7.4	10.7	8.5	1	540	1	1	2
62	1021111	24	1	0	0	0	37.14	8.6	12.6	10.9	1	200	2	2	2
63	1021165	27	1	0	0	0	39.42	8.6	11.4	10.5	1	300	2	1	2
64	1021313	26	2	1	1	0	40.14	8.7	10.9	10.1	2	350	2	2	2
65	1021324	26	1	0	0	0	39.85	8.4	14.5	10.8	2	360	2	2	2
66	1021359	23	1	0	0	0	38	8.9	10.1	9.7	1	150	2	2	2
67	1021357	27	2	1	1	0	38.14	9.2	13.8	12.8	1	100	2	2	2
68	1021412	26	2	1	0	0	37.28	8.9	12.4	12	2	350	2	1	2
69	1021432	21	1	0	0	0	40	8.6	11.5	9.9	2	490	2	1	2
70	1021532	24	1	0	0	0	30.57	8.2	12.5	12.1	1	250	2	2	2
71	1021560	24	1	0	0	0	37.57	8.8	12.1	11	2	280	2	2	2
72	1021533	19	1	0	0	0	41	9.3	10	8.5	1	450	2	1	2
73	1021721	24	2	1	1	0	39.85	8.7	12.3	11.9	1	360	2	1	2
74	1022188	20	1	0	0	0	38.28	8.9	12.1	10.4	2	350	2	2	2
75	1022191	32	2	1	0	0	40.42	8.7	11.9	9.4	2	600	2	1	2
76	1022290	21	1	0	0	0	39.14	8.8	12.7	12.5	2	380	2	2	2
77	1022555	22	1	0	0	0	39	8.7	13	12.4	2	500	2	2	2
78	1022569	35	2	0	0	1	38.71	8.4	11.1	9.8	2	510	2	1	2
79	1022592	28	1	0	0	0	38.28	7.5	13.1	12.2	1	200	2	2	2
80	1022688	20	1	0	0	0	39.85	7.8	12.4	10.2	1	360	2	1	2
81	1023219	22	1	0	0	0	37.57	7.9	12.2	9.3	1	510	2	1	2
82	1023335	23	1	0	0	0	39.14	8.8	11	10.1	1	200	2	2	2
83	1023489	23	1	0	0	0	37.71	9.4	10.9	10.4	1	240	2	2	2
84	1023570	30	2	1	1	0	38.57	8.3	10.3	9.2	2	250	2	2	2
85	1023552	25	2	1	1	0	37.71	8.6	10.3	9.8	2	200	2	2	2
86	1023726	24	1	0	0	0	37.85	9.7	11	9.2	1	350	2	2	2

87	1023741	23	1	0	0	0	39.42	8.4	13.2	10.8	1	400	2	1	2
88	1023798	27	2	1	1	0	39.85	8.8	13.2	11.1	1	150	2	2	2
89	1023862	19	1	0	0	0	39.14	9	11.4	10	1	250	2	2	2
90	1023959	21	2	1	1	0	37	8.5	10.6	9.9	2	410	2	2	2
91	1024085	32	1	0	0	0	39.85	9	13	12.2	2	390	2	2	2
92	1024165	20	1	0	0	0	39.28	8.5	10.3	9.8	1	300	2	2	2
93	1024181	22	1	0	0	0	38.14	8.5	10.2	9.6	1	150	2	2	2
94	1024223	21	1	0	0	0	38.28	9.1	13.1	12.7	1	260	2	2	2
95	1024157	22	1	0	0	0	40.7	9.2	10.8	10.1	2	360	2	2	2
96	1024320	28	2	1	1	0	38.42	8.8	13.4	12.8	2	410	2	2	2
97	1024323	23	1	0	0	0	38.42	9.5	13.4	12.9	2	310	2	2	2
98	1024325	24	2	1	1	0	38.71	9.1	10.8	10.1	2	320	2	2	2
99	1024315	31	2	1	1	0	39.42	8.3	11.4	10.6	2	250	2	2	2
100	1024410	28	2	0	0	1	38	9	15.7	14.8	1	120	2	2	2
101	1024397	26	2	1	1	0	37.28	8.1	10.8	9.6	2	480	2	2	2
102	1024421	23	2	1	1	0	40	9	11.7	10.2	1	700	1	1	2
103	1024218	23	2	1	0	0	37.28	8.2	11	10.1	2	360	2	2	2
104	1024414	21	2	1	1	0	38.28	8.3	10.6	9.6	2	450	2	2	2
105	1024751	28	2	1	1	0	38.71	9	11.1	10.6	2	360	2	2	2
106	1024757	23	1	0	0	0	37.71	8.6	11.5	10	2	400	2	2	2
107	1024944	21	1	0	0	0	39	7.8	11.9	8.8	1	600	1	1	2
108	1024835	19	1	0	0	0	38.71	8.5	11.7	10.5	1	250	2	2	2
109	1025004	30	2	1	1	0	39.85	8.5	11.2	10.2	2	500	2	1	2
110	1025154	21	2	0	0	1	39.57	8.8	13.2	12.2	1	120	2	2	2
111	1026193	25	1	0	0	0	39.57	7.9	11.2	9.9	2	800	2	1	2
112	1033705	30	2	1	1	0	38.85	8.4	11.1	9.6	2	410	2	2	2
113	1033964	25	2	1	1	0	38.57	8	12.5	11.1	2	350	2	2	2
114	1034125	20	1	0	0	0	39.57	9.3	12	9.9	2	300	2	2	2
115	1034143	25	2	1	1	0	39.71	10	13.9	13	1	150	2	2	2
116	1034972	28	2	1	1	0	39.85	8.6	10.2	9.8	1	350	2	1	2
117	1035164	25	1	0	0	0	38.42	9.1	11.5	10.4	2	250	2	2	2
118	1034644	21	1	0	0	0	37	8.1	13.8	12.8	1	200	2	2	2
119	1035153	22	1	0	0	0	39.14	9.4	11.3	8.9	1	250	2	2	2
120	1035304	25	2	1	1	0	37.28	8.9	12.7	11.6	2	450	2	2	2
121	1035302	28	1	0	0	0	38.28	8.9	13.8	12.2	2	350	2	2	2
122	1035369	22	1	0	0	0	40	8.8	13	10.2	2	460	2	2	2
123	1035355	20	1	0	0	0	38.71	8.7	13.1	11.3	1	200	2	2	2
124	1035475	19	1	0	0	0	38.85	10.7	12.6	11.5	1	150	2	2	2
125	1035571	20	1	0	0	0	38.57	8.8	12.9	11.2	1	560	1	1	2
126	1035723	29	2	1	1	0	38.42	10.1	12.6	12	2	490	2	2	2
127	1035331	28	1	0	0	0	39.42	9.6	10.3	9.7	2	410	2	2	2
128	1036052	30	2	1	1	0	38.14	9	10.7	9.6	2	480	2	2	2
129	1036220	25	2	1	0	0	40	8.5	12.1	11.6	2	300	2	2	2
130	1036623	20	1	0	0	0	38.42	8.2	1.9	10.5	2	490	2	1	2

131	1036864	30	2	1	1	0	38	8.3	11.6	11.3	1	200	2	2	2
132	1037051	29	2	1	1	0	40.14	8.7	11.8	10.4	2	380	2	2	2
133	1037131	23	2	1	1	0	38.71	8.9	12.1	11.6	1	220	2	2	2
134	1037035	20	2	0	0	1	37.57	9	11.3	10.3	2	390	2	2	2
135	1037428	24	1	0	0	0	38.85	8.7	13.2	10.6	1	450	2	1	2
136	1037619	24	2	1	1	0	38.4	8.4	10.8	10.3	2	350	2	2	2
137	1037589	26	2	1	1	0	37.28	8.7	13.3	11.2	1	200	2	2	2
138	1037695	28	1	0	0	0	37.28	8	13	11.1	2	390	2	2	2
139	1037750	30	2	1	1	0	38.85	8.6	13.9	11.6	1	250	2	1	2
140	1037581	21	1	0	0	0	38.28	8.1	11.2	9.6	2	510	2	1	1
141	1037376	23	2	1	1	0	31.28	8.8	11.8	10.6	2	550	2	2	1
142	1037994	25	1	0	0	0	37.71	9	12.3	11.8	2	760	2	1	2
143	1038113	24	1	0	0	0	38.14	8.7	12.3	11.2	2	540	2	2	2
144	1038224	27	2	1	1	0	39.85	8.5	13.2	11.2	1	650	1	1	2
145	1038445	24	1	0	0	0	40	9.1	13.6	11.3	2	410	2	2	2
146	1038550	20	1	0	0	0	38.57	8.2	13.7	11.9	2	350	2	2	2
147	1038829	18	1	0	0	0	39.14	8.1	11.8	9.7	2	460	2	2	2
148	1038866	16	2	1	1	0	37.57	8.8	12.5	10.8	2	380	2	2	2
149	1038085	24	2	1	1	0	37	8.5	10.1	8.4	2	600	2	2	2
150	1037814	18	1	0	0	0	37.14	9.3	11.2	10.4	2	380	2	2	2
151	1039078	22	1	0	0	0	37	9.1	13.2	12.1	2	370	2	2	2
152	1039152	22	2	0	0	1	39.28	8	14.4	11.8	2	500	2	1	2
153	1038879	31	2	1	1	0	39.28	6.6	11.4	10.1	2	510	2	1	1
154	1039269	25	2	1	1	0	38.57	8.2	10.2	9.6	1	550	1	1	2
155	1039512	25	2	1	1	0	40	7.5	13.9	11.2	1	450	2	1	2
156	1039476	27	2	1	1	0	40.14	8.2	13.4	12.5	2	530	2	1	2
157	1039539	31	1	0	0	0	39.42	8.2	12	10.2	2	310	2	2	2
158	1039742	30	2	1	1	0	39.57	8.9	13.5	12.2	2	490	2	2	2
159	1039547	22	1	0	0	0	39.71	8.8	13.2	11.1	1	300	2	2	2
160	1039760	28	2	1	1	0	39.42	9.1	12.8	12.2	2	380	2	2	2
161	1039954	25	1	0	0	0	41.42	8	10.2	8.9	2	600	2	1	1
162	1039972	31	2	1	1	0	39.85	8.8	10.8	9.1	1	260	2	2	2
163	1039489	32	2	1	1	0	39	8.7	11.9	11.4	2	360	2	2	2
164	1040149	21	1	0	0	0	37.14	8.9	12.3	11	2	380	2	2	2
165	1040167	33	2	1	1	0	38.28	8.2	12.8	12.3	2	600	2	2	2
166	1040173	26	1	0	0	0	37.28	8.6	13.3	11.9	2	530	2	2	2
167	1039054	23	1	0	0	0	37	9.1	12.4	10.6	2	460	2	2	2
168	1040310	20	1	0	0	0	40.71	8.8	11.6	10.6	1	250	2	2	2
169	1040286	25	2	1	1	0	30.14	8.5	13.2	11.1	1	480	2	2	2
170	1040293	33	2	1	1	0	38.71	7.5	10.8	9.8	2	600	2	1	2
171	1040515	23	1	0	0	0	39.14	7.9	13.9	12.2	2	540	2	2	2
172	1040073	29	2	1	1	0	38.14	8.1	10.9	09-Jan	2	640	2	2	2
173	1039936	21	1	0	0	0	37	8.3	11.9	11.1	2	350	2	2	2
174	1040511	20	1	0	0	0	39.14	8.7	12.9	11.3	2	500	2	2	2

175	1039743	28	2	0	0	1	38.85	9.2	13	12.1	2	360	2	2	2
176	1040606	33	1	0	0	0	37.57	7.5	14.7	10.4	2	800	2	1	1
177	1040874	24	1	0	0	0	38.28	8.3	12.3	10.5	2	400	2	2	2
178	1039768	22	2	1	1	0	38	9.2	10.9	9.6	2	410	2	2	2
179	1038643	26	1	0	0	0	39.42	12.7	11.3	8.4	2	510	2	2	2
180	1041089	24	1	0	0	0	38.28	8.4	13.2	11.1	1	800	1	1	2
181	1041259	21	1	0	0	0	38.42	9	10.8	10.1	1	150	2	2	2
182	1041207	20	1	0	0	0	38.28	9.1	12.9	12.7	1	180	2	2	2
183	1041249	20	1	0	0	0	40	8.9	11.5	9.8	2	400	2	2	2
184	1041591	26	1	0	0	0	37.85	7.8	12.1	8.8	2	700	2	1	1
185	1041179	23	2	1	1	0	38.85	7.9	10.5	9.7	2	440	2	2	2
186	1041145	23	2	1	1	0	37.85	7.8	12.5	11.4	2	670	2	1	1
187	1041364	28	1	0	0	0	38.71	9	12.9	11.6	1	300	2	2	2
188	1041446	21	1	0	0	0	40.14	9	12.1	11.5	1	240	2	2	2
189	1041613	20	1	0	0	0	39.85	8.7	11.4	10.8	2	650	2	2	2
190	1041707	21	1	0	0	0	39.28	8.4	13.2	12.1	1	260	2	2	2
191	1041744	24	2	0	0	1	39	8.3	12.7	11.6	1	320	2	2	2
192	1041978	26	1	0	0	0	40.71	9.1	14.5	13	2	250	2	2	2
193	1041963	28	2	1	1	0	39.42	8.2	13.5	11.7	2	500	2	2	2
194	1042223	30	2	1	1	0	38.42	8.6	12	10.8	2	390	2	2	2
195	1042182	26	2	1	1	0	38.28	8.6	13.4	11.4	2	600	2	1	2
196	1043159	25	2	1	1	0	38.57	7.7	10.2	9.3	2	580	2	2	2
197	1043068	26	2	1	1	0	38.42	8	13.6	12.1	2	480	2	2	2
198	1042906	21	2	1	1	0	38.57	8	10.5	10.2	2	480	2	2	2
199	1043298	25	2	1	1	0	38.28	8.8	11.4	10.21	2	460	2	2	2
200	1043789	20	1	0	0	0	38.71	8.3	11.4	10.3	2	510	2	2	2
201	1043628	31	2	1	0	0	38.14	7.2	12.1	9.6	1	590	1	1	2
202	1043786	30	1	0	0	0	37.85	9.2	11.6	9.8	2	800	2	1	2
203	1043884	30	1	0	0	0	40	7.9	10.6	8.3	1	510	1	1	2
204	1043840	25	1	0	0	0	37.85	7.8	11	10.2	2	460	2	2	2
205	1044457	22	1	0	0	0	39.14	8.8	13.4	11.1	1	250	2	2	2
206	1046386	35	2	1	1	0	38.57	7.8	10.4	10.1	2	460	2	2	2
207	1046741	20	1	0	0	0	39	8.2	11.9	9.7	1	360	2	2	2
208	1044943	22	2	0	0	1	37.14	8.3	11	10.6	1	300	2	2	2
209	1045653	24	1	0	0	0	40.42	8.2	11.9	10.5	2	440	2	2	2
210	1047077	25	2	1	1	0	38.57	8.8	12.8	11.8	2	500	2	2	2
211	1046873	30	1	0	0	0	40.42	8.5	13.1	12.3	1	180	2	2	2
212	1008641	23	1	1	1	0	39	9.1	12.4	10.1	1	460	2	1	2
213	1046989	19	1	0	0	0	38.85	8.3	11.8	11.4	1	200	2	2	2
214	1047277	28	1	0	0	0	39.57	8.2	10.9	9.8	1	250	2	2	2
215	1047312	27	2	1	1	0	40	8.3	13.9	12.4	2	560	2	2	2
216	1047095	38	2	1	1	0	39.14	8.9	11.5	11.2	2	460	2	1	2
217	1044019	26	1	0	0	0	39.14	8	10.2	10.8	2	380	2	2	2
218	1047211	23	1	0	0	0	39.42	8.7	13.2	11.8	1	310	2	2	2

219	1046519	26	2	1	1	0	37.42	7.2	12.5	10.8	2	580	2	1	2
220	1047844	24	1	0	0	0	39.57	7.7	12.7	9.8	1	420	2	1	2
221	1048043	23	1	0	0	0	39.85	8.2	12.7	12	1	200	2	2	2
222	1049040	30	2	1	1	0	39.42	8.2	10.8	9.2	2	400	2	2	2
223	1049025	25	2	1	1	0	39.14	8.2	10.2	8.8	2	600	2	1	2
224	1049051	22	2	0	0	1	37.71	8.5	10.5	10	1	200	2	2	2
225	1049145	21	1	0	0	0	40.71	9.3	10.3	9.8	1	180	2	2	2
226	1049720	20	1	0	0	0	39.85	8.2	12.4	11.8	2	450	2	2	2
227	1050162	30	2	1	1	0	39.57	8.9	13.1	12.8	1	190	2	2	2
228	1050331	29	1	0	0	0	38.71	7.7	12.3	10	2	580	2	1	1
229	1050426	22	1	0	0	0	39.28	8.4	14.8	12.5	1	450	2	1	2
230	1050454	20	1	0	0	0	37.14	7.6	11.2	10.6	1	440	2	1	2
231	1050467	21	2	1	1	0	38.57	8.6	10.6	9.5	1	180	2	2	2
232	1050509	32	1	0	0	0	40.57	7.9	11.5	9.2	2	680	2	1	2
233	1050544	30	2	1	1	0	40.14	8.6	13	11.2	2	450	2	2	2
234	1050430	27	1	0	0	0	38.71	8.1	11.1	10.1	2	560	2	2	2
235	1050193	20	1	0	0	0	39.28	9.1	11.5	10.6	2	280	2	2	2
236	1050887	22	1	0	0	0	39.14	8.2	13.1	12.7	2	400	2	2	2
237	1050962	24	2	1	1	0	39.42	9.4	14.6	13.8	2	300	2	2	2
238	1054059	22	1	0	0	0	40.57	7.9	10.5	9.3	1	450	2	1	2
239	1054087	24	1	0	0	0	39.28	7.2	10.8	8.7	2	1050	1	1	1
240	1054160	20	1	0	0	0	37.28	9.1	10.7	10	1	150	2	2	2
241	1057521	22	1	0	0	0	38.85	8.4	11.8	11.3	1	350	2	2	2
242	1057491	25	2	1	1	0	40	8.3	13	12.2	2	330	2	2	2
243	1057041	26	1	0	0	0	39.42	9.5	13	12.4	1	150	2	2	2
244	1057040	22	1	0	0	0	38	9.3	11.2	10.8	1	180	2	2	2
245	1057036	23	2	1	1	0	39.85	9.3	10.7	10.1	2	500	2	2	2
246	1057034	24	2	1	1	0	39	8.9	11.4	10.4	2	400	2	2	2
247	1057021	25	2	1	1	0	39	9.3	12.2	11.4	2	360	2	2	2
248	1057018	21	1	0	0	0	38.57	8.7	11.9	10.8	1	250	2	2	2
249	1057000	23	1	0	0	0	39.85	9.6	13	10.6	2	450	2	2	2
250	1056831	25	1	0	0	0	40.71	8.7	13	12.2	2	400	2	2	2
251	1056992	19	1	0	0	0	37.85	8.7	12.6	10.2	2	380	2	2	2
252	1056901	27	2	1	1	0	36.28	7	15.9	12.8	2	650	2	1	1
253	1056870	23	2	1	1	0	41	8.6	11.6	11.2	1	150	2	1	2
254	1056831	25	1	0	0	0	40.71	8.7	13	12.2	2	400	2	2	2
255	1056595	22	1	0	0	0	37.85	8.4	11.9	10.4	1	200	2	2	2
256	1056766	26	2	1	1	0	39.57	8.8	12.2	11.8	1	180	2	2	2
257	1056608	22	1	0	0	0	38.14	9	12.4	11.3	2	400	1	2	2
258	1056566	22	1	0	0	0	38.85	8.6	13.6	12.8	1	200	2	1	2
259	1056602	22	1	0	0	0	37.28	9.2	11.3	10.6	2	200	2	1	2
260	1056591	25	2	1	1	0	37.71	7.9	10.8	8.2	1	500	1	1	2
261	1056583	25	2	1	1	0	38.71	8.7	13.3	12.3	1	200	2	2	2
262	1056567	30	2	0	0	0	37.42	8.2	13.4	11.2	1	200	2	1	2

263	1056218	25	1	0	0	0	40.14	8.1	11.3	10.6	2	500	2	2	2
264	1056523	23	2	1	1	0	32.28	8.3	12.6	11.2	1	180	2	2	2
265	1056485	28	2	1	1	0	37.57	7.3	11.7	9	1	510	1	1	2
266	1056476	21	1	0	0	0	38.28	7.9	11.6	9.6	2	800	2	1	1
267	1056470	21	1	0	0	0	40	8	11.7	10.4	1	200	2	2	2
268	1056428	21	1	0	0	0	40.71	9	11.3	10.2	2	500	2	1	2
269	1056405	24	1	0	0	0	37.85	8.7	11.2	10.6	1	250	2	2	2
270	1056362	22	2	1	1	0	38.85	8.3	12.3	11.2	2	410	2	2	2
271	1056335	27	2	1	1	0	38.71	7.6	10.1	8.6	2	750	2	1	1
272	1056327	25	2	1	1	0	37	8.8	10.8	9.5	2	440	2	2	2
273	1056325	20	1	0	0	0	39.28	7.7	10.9	8.4	1	500	1	1	2
274	1056322	22	2	1	1	0	39.57	7.6	10.2	9	1	410	2	1	2
275	1056307	27	1	0	0	0	37.57	8.3	11.6	10.2	2	510	2	1	2
276	1056303	21	2	1	1	0	39.28	9	12.6	10.6	1	220	2	2	2
277	1056296	21	2	0	0	1	39.14	8.3	12.1	11.1	2	400	2	2	2
278	1056288	20	1	0	0	0	39.14	8.3	11.4	10.2	2	510	2	1	2
279	1056294	20	2	0	0	1	37	8.5	11.4	10	2	560	2	2	2
280	1056237	26	2	1	1	0	38.14	8.7	13.8	12.8	1	200	2	2	2
281	1056060	32	2	1	1	0	38.42	8.6	11.8	11.3	2	410	2	1	2
282	1056081	21	1	0	0	0	40.14	8.4	11.5	10.1	2	480	2	1	2
283	1056088	19	1	0	0	0	39.57	8.2	12	10.6	1	120	2	2	2
284	1056114	23	1	0	0	0	37.14	8.2	11.8	11.1	1	180	2	1	2
285	1056123	20	1	0	0	0	41	7.9	13	10.2	2	780	2	1	2
286	1056121	24	1	0	0	0	41	8.9	13	11.8	2	460	2	2	2
287	1056139	30	2	1	1	0	37	7.9	11.8	10.5	1	410	2	1	2
288	1056144	28	2	1	1	0	38.14	8.1	13.4	11.6	2	550	2	2	2
289	1056127	20	1	0	0	0	40.28	7.5	13.4	8.8	1	700	1	1	2
290	1055970	22	1	0	0	0	39.57	8.8	13.1	11.8	2	700	2	1	1
291	1055972	24	2	0	0	1	39.85	7.6	10.9	9.1	1	400	2	1	2
292	1055981	26	1	0	0	0	39.85	8	12.3	11.8	1	180	2	2	2
293	1055982	26	1	0	0	0	41	8.9	14.1	13.2	2	480	2	1	2
294	1055993	22	1	0	0	0	37.57	8.8	14.7	13.8	2	640	2	1	2
295	1056004	25	1	0	0	0	39	8.3	14.1	13	1	210	2	1	2
296	1056060	32	2	1	1	0	38.42	8.6	11.8	10.6	2	450	2	2	2
297	1056075	20	1	0	0	0	37.85	8.9	13.3	13	1	210	2	2	2
298	1056063	27	1	0	0	0	41	8.6	10.1	9.6	1	180	2	1	2
299	1055848	21	1	0	0	0	37.14	9	13	12.2	2	380	2	2	2
300	1055962	28	2	0	0	1	38.42	7.9	12.7	11.6	2	550	2	1	2
301	1055981	26	1	0	0	0	39.85	7.9	11.4	9.6	1	460	2	1	2
302	1055972	24	2	1	1	0	38.85	7.6	10.9	8.8	1	380	2	2	2
303	1055970	22	1	0	0	0	39.57	8.8	13.1	12.6	2	600	2	2	2
304	1055877	24	1	0	0	0	39	8.7	12.7	11.6	1	150	2	2	2
305	1055912	22	1	0	0	0	40.57	8.7	13.8	12.8	1	180	2	1	2
306	1056806	36	1	0	0	0	38.57	7.2	13.6	10.2	2	710	2	1	1

307	1055873	20	2	1	1	0	39	8.1	12	11.6	1	120	2	2	2
308	1055861	20	1	0	0	0	39.57	8.6	12.9	12.6	2	360	2	2	2
309	1055888	26	2	1	1	0	38.42	8	10.9	9.8	1	160	2	2	2
310	1055844	21	1	0	0	0	41	7.9	10.8	9.2	2	680	2	1	2
311	1055863	23	2	1	1	0	8.2	12.6	12	39.28	1	120	2	2	2
312	1055722	25	1	0	0	0	37.28	8	13.9	12.7	2	300	2	2	2
313	1055736	29	2	1	1	0	39.57	8.3	11.2	10.6	2	500	2	1	2
314	1055493	26	1	0	0	0	37.71	7.9	14	11.6	1	450	2	1	2
315	1055416	25	1	0	0	0	39.57	8.6	12.7	11.2	2	410	2	1	2
316	1055319	27	2	1	1	0	37.14	8.1	11.3	10.7	1	200	2	1	2
317	1054539	24	1	0	0	0	39	8	11.1	9.8	2	600	2	1	2
318	1061869	22	1	0	0	0	40.14	8.9	11.8	10.5	1	380	2	2	2
319	1061382	21	1	0	0	0	38.28	8.2	11.4	9.8	1	260	2	2	2
320	1061721	22	2	1	1	0	39.14	8.6	12.6	11.7	2	540	2	1	2
321	1061481	26	2	0	0	1	39.42	8.6	11.9	11.4	1	180	2	2	2
322	1061332	24	2	1	0	0	37.85	9.6	12.7	11.7	2	380	2	1	2
323	1061306	29	1	0	0	0	37.85	8.6	13.2	12.4	2	460	2	2	2
324	1060815	29	1	0	0	0	35.28	7.8	12	9.7	2	680	2	1	1
325	1060986	21	1	0	0	0	38.85	9	10.2	9.5	1	150	2	2	2
326	1060713	23	1	0	0	0	39.42	9.4	11.1	10.2	1	180	2	2	2
327	1061046	27	1	0	0	0	40.71	8.8	11.6	10.1	1	300	2	1	2
328	1060893	24	1	0	0	0	39	8.3	11.1	10.8	1	120	2	2	2
329	1060900	28	2	1	1	0	38.14	9.4	12.7	12.4	2	480	2	2	2
330	1060901	26	1	0	0	0	37.57	8.6	13	11.8	2	550	2	1	2
331	1060665	21	1	0	0	0	38.71	6.7	13.2	9.8	1	600	1	1	2
332	1060653	24	1	0	0	0	38.28	8.9	13.1	11.8	1	180	2	2	2
333	1060564	26	1	0	0	0	37.57	9	12.8	10.1	1	250	2	2	2
334	1059758	24	2	1	1	0	38.85	8.5	11.1	10.5	2	450	2	1	1
335	1060126	21	1	0	0	0	40.14	8.9	11.1	10.5	1	350	2	1	2
336	1060433	25	2	1	1	0	37.71	8.6	12.5	10.9	2	400	2	2	2
337	1060198	23	1	0	0	0	39.71	8.4	13.5	12.8	2	600	2	1	1
338	1060113	26	2	1	0	0	38.42	8.1	12.3	11.8	2	450	2	2	2
339	1059995	36	2	1	1	0	39.14	8.5	10.6	9.8	2	500	2	1	2
340	1060009	29	1	0	0	0	39.14	9.1	11.5	10.1	2	500	2	1	1
341	1067397	23	2	1	1	0	37.57	8.1	13	11.7	2	640	2	2	2
342	1067070	25	2	1	1	0	38.28	8.2	12.2	11.6	2	550	2	2	2
343	1066065	34	2	0	0	1	40.42	7.7	11	8.1	2	800	2	1	1
344	1067578	26	2	0	0	1	37.14	8.6	11.8	11.2	2	550	2	2	2
345	1067563	30	1	0	0	0	39.42	8	12.3	11.2	2	350	2	2	2
346	1067625	22	1	0	0	0	38.85	8.5	13.3	12.3	1	150	2	2	2
347	1057668	25	1	0	0	0	38.85	8.7	12.7	12	2	450	2	1	2
348	1067687	23	1	0	0	0	37.14	8.7	11.6	11	1	550	1	2	2
349	1067705	27	1	0	0	0	38.85	8.6	16.5	13.6		450	2	1	2
350	1067686	24	1	0	0	0	40	8.5	12.2	10.7	2	480	2	1	1

351	1067806	25	2	1	1	0	39.42	8.5	12.2	11.1	2	560	2	2	2
352	1067315	25	2	1	1	0	37.57	9.2	12.2	11.6	1	150	2	2	2
353	1067705	20	1	0	0	0	38.14	8.4	11.7	8.9	1	600	1	1	2
354	1067888	26	2	1	1	0	39.28	8.7	12.6	10.8	2	480	2	1	2
355	1067996	28	2	0	0	1	37.14	8.2	12.7	11.2	2	600	2	2	2
356	1067703	23	1	0	0	0	38.14	8.7	10.5	10	2	350	2	2	2
357	1068052	29	2	1	1	0	38.71	8.7	11.8	9.9	1	450	2	1	2
358	1068021	29	1	0	0	0	40.57	9.1	12.7	11.6	1	280	2	1	2
359	1068064	27	1	0	0	0	39.28	7.8	10.4	8.2	1	540	1	1	2
360	1068222	21	1	0	0	0	39.71	8.3	12.4	11.8	1	200	2	2	2
361	1068240	21	2	0	0	0	37.42	8.4	10.8	10.1	1	300	2	2	2
362	1068242	25	2	1	1	0	41	8.3	11.4	10.6	1	210	2	2	2
363	1068235	21	2	0	0	1	40.71	8.1	13.5	12.3	1	410	2	1	2
364	1068229	21	1	0	0	0	38.28	8.3	10.9	10	2	550	2	2	2
365	1068267	26	2	0	0	1	37.14	8.6	11.8	10.2	2	630	2	1	1
366	1067610	21	1	0	0	0	37	8.6	11.8	10.6	1	200	2	2	2
367	1068023	36	1	0	0	0	37.71	9.2	13.8	12.8	1	260	2	2	2
368	1068271	26	2	0	0	1	39.28	7.9	10.8	8.1	1	410	2	1	2
369	1068263	26	1	0	0	0	40	8.8	13.2	12.6	1	180	2	2	2
370	1067886	24	2	0	0	1	38.42	8.7	13.3	11.8	1	550	1	1	2
371	1069937	26	2	0	0	1	39.28	7.2	10.8	8.1	1	410	1	1	2
372	1070499	26	1	0	0	0	40.71	8.9	10.5	10.1	2	500	2	1	2
373	1070600	30	2	1	1	0	38.14	8.5	12.5	11.7	1	200	2	2	2
374	1070688	26	2	0	0	1	40.71	7.6	11.8	8.2	2	650	2	1	1
375	1071813	23	2	0	0	1	39.14	9	13.3	12.9	2	560	2	2	2
376	1072250	23	1	0	0	0	40	7.6	10.6	7.2	2	810	2	1	1
377	1072278	22	1	0	0	0	37.28	8.4	12.9	11.7	1	150	2	2	2
378	1071951	26	2	1	1	0	38.42	7.8	11.6	8.6	2	850	2	1	1
379	1072240	27	1	0	0	0	37.42	8.3	11.1	10.8	2	450	2	2	2
380	1072405	22	1	0	0	0	39	7.1	11.8	8.5	1	400	2	1	2
381	1072433	27	2	1	1	0	39	8.7	10.6	10.4	1	200	2	2	2
382	1072424	25	2	1	1	0	39.71	8.6	13.3	12.2	1	150	2	2	2
383	1072386	24	1	0	0	0	37.42	8.5	11	9.8	2	540	2	1	2
384	1072514	28	2	1	1	0	37.42	8.8	12.1	10.9	1	250	2	2	2
385	1072480	26	1	0	0	0	40.42	8.3	10.6	8.5	2	700	2	1	1
386	1071984	23	1	0	0	0	38.57	8.6	11	9.5	1	200	2	2	2
387	1072882	27	1	0	0	0	40.14	8.6	12.8	11.2	2	600	2	2	2
388	1075280	30	1	0	0	0	39.28	9.1	14.9	13.2	1	200	2	1	2
389	1073570	28	2	0	0	1	38.14	8.7	12.3	9.8	2	530	2	1	2
390	1075303	30	2	0	0	1	38	8.7	13.1	12	2	550	2	2	2
391	1071080	26	2	1	1	0	37.42	8.9	11.4	10.2	1	150	2	2	2
392	1075304	28	1	0	0	0	38.42	8.5	11.9	11.2	2	350	2	2	2
393	1071242	23	1	0	0	0	38.57	9.8	10.7	10.1	2	400	2	1	2
394	1075231	22	2	1	1	0	39	8.9	11.4	10.2	1	200	2	2	2

395	1076102	37	1	0	0	0	38.42	9	13.2	10.1	2	600	2	1	1
396	1076235	22	2	1	1	0	38.57	8.9	13.2	12.7	2	450	2	2	2
397	1075706	25	2	1	1	0	40.14	7.6	13	10.1	1	540	1	1	2
398	1075646	29	2	0	0	1	39.28	8.2	14	12.1	1	350	2	1	2
399	1076704	27	1	0	0	0	37.14	8.7	12.2	10.8	2	580	2	2	2
400	1075868	24	2	1	1	0	37.14	7.8	11.2	9.1	1	500	1	1	2