KAIRUKI UNIVERSITY

DEPARTMENT OF OBSTETRIC AND GYNAECOLOGY

PREDICTIONS OF INTRA-ABDOMINAL ADHESIONS USING ULTRASONOGRAPH AND BIRTH OUTCOMES AMONG TERM PREGNANT MOTHERS WITH PREVIOUS SCAR ATTENDING ANTENATAL CLINIC AT MNAZI MMOJA REFERRAL HOSPITAL, ZANZIBAR.

By

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Dissertation submitted to the Faculty of Medicine in partial fulfilment of the requirements for the degree of Master of Medicine in Obstetrics and Gynaecology of Kairuki University

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CERTIFICATION

The undersigned certifies that he has read and at this moment recommends for examination by Kairuki University a dissertation entitled "**PREDICTIONS OF INTRA-ABDOMINAL ADHESIONS USING ULTRASONOGRAPHY, SLIDING SIGN, AND BIRTH OUTCOMES AMONG TERM PREGNANT MOTHERS WITH PREVIOUS SCAR ATTENDING ANTENATAL CLINIC AT MNAZI MMOJA REFERRAL HOSPITAL, ZANZIBAR"** in (partial) fulfillment of the requirements for the degree of Master of Medicine in Obstetrics and Gynecology at Kairuki University.

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I, **Chausiku Jumbe Darwesh** declare that this dissertation is my original work, and it has not been presented and will not be presented to any other University for a similar or any other degree award.

Signature---------- Date 17/10/2025

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DEDICATION

This work is dedicated to the Ministry of Health Zanzibar for my academic and financial support during my study period and to the people who have helped me throughout my journey including my family and Supervisor who gave me strength when I thought of giving up.

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OPERATIONAL DEFINITIONS

Ultrasonography sliding sign: will be defined as relative motion between the abdominal and uterine wall as assessed by ultrasonography.

Positive sliding sign: will be said when sliding of the uterus caudally against the abdominal wall muscles will be seen.

Negative sliding sign: when sliding of the uterus caudally to the uterus will not be seen seem

Adverse maternal outcomes: will be defined by the occurrence of bowel injuries, bladder injuries,

Good neonatal outcome: will be considered when neonates are born with an Apgar score of >7 in 5 minutes.

Adverse neonatal outcomes: will be considered when neonates with Apgar score <7 in 5 minutes, neonates admitted to ICU, and fresh stillbirth.

LIST OF ABBREVIATIONS

ACOG - American College of Obstetrics and Gynecology

AIDS - Acquired Immune Deficiency Syndrome

AVD - Assisted Vaginal Delivery.

BP - Blood Pressure.

C/S - Cesarean Section

DDI - Decision Delivery Interval

ECS - Emergency Cesarean Section.

FHR - Fetal Heart Rate

KU - Kairuki University.

MMRH - Mnazi Mmoja Referral Hospital

MDG - Millennium Development Goal

MMR - Maternal Mortality Rate

MTUHA - Mfumo wa Taarifa za Uendeshaji wa Huduma za Afya.

NMR - Neonatal Mortality Rate.

NICE - National Institute of Health and Clinical Excellence.

NICU - Neonatal Intensive Care Unit

NRFHR - Non-Reassurance Fetal Heart Rate,

PR - Pulse Rate.

PPH - Postpartum Hemorrhage

SVD - Spontaneous Vaginal Delivery

SPSS - Statistical Package of Social Science.

SOPs - Standard Operative Procedures.

TAH - Total Abdominal Hysterectomy

TDHS - Tanzania Demographic Health Survey

WHO - World Health Organization.

ABSTRACT

Introduction: Intra-abdominal adhesions represent a major concern in the obstetrical ward due to the increased morbidity and mortality from both mother and neonates during caesarian section. This study aimed to determine the proportion of intraabdominal adhesion and their patterns using Ultrasonography sliding sign among term pregnant women with previous scars attending MMRH. In addition, the study aimed to determine the correlation between intra-abdominal adhesion and birth outcomes.

Methods: This study employed a prospective cohort study involving interviews, medical record reviews, preoperative assessment of intraabdominal adhesion using Ultrasonography sliding sign, and post-partum follow-up of both mother and neonate. Descriptive statistics, chi-square analysis and logistic regression were used for data analysis.

Results: The study found the proportion of intra-abdominal adhesion at 81(47.1%). Moderate adhesions were the most prevalent 61(35.5%) and 20(11.6 %) of patients also had severe adhesion. Occurrence of birth asphyxia (Apgar<7) was significantly associated with the presence of intra-abdominal adhesion. The overall sensitivity and specificity of the USS ultrasonography scan were 48% and 68%, respectively. USS was more sensitive and specific to predict severe adhesion respectively in 83.3% and 100%.

Conclusion: The proportion of intra-abdominal adhesions assessed using ultrasonography sliding sign among pregnant women with previous scars attending MMRH was relatively high compared to that reported in different literature. Moderate adhesions were the most prevalent form observed. However, USS had high accuracy in predicting severe intraabdominal adhesions with high sensitivity and specificity. There was a strong correlation between a low Apgar score and the presence or absence of intra-abdominal adhesions.

CHAPTER ONE

BACKGROUND AND INTRODUCTION

1.1. Background of the study.

Over the years, global caesarian section (CS) rates have significantly increased from around 7% in 1990 to 21% today surpassing the ideal acceptable CS rate which is around 10%–15% according to the WHO (1).

In the past ten years, there has been a sharp rise in Caesarean sections (CS) worldwide, a frequent surgical procedure in obstetrics. In the USA, the rate of CS has reached up to 32.1%, while in Egypt, it has reached 51.8% (2,3). Intra-peritoneal adhesion is one of the most common complications related to CS, and it raises surgical challenges and the likelihood of bowel and bladder injury (4).

The incidence of intraperitoneal adhesions with intra-abdominal procedures has been reported in the general surgical literature to range from 67% to 93%. The rate of occurrence of intraperitoneal adhesion varies worldwide and is multifactorial (5).

Post-caesarian section intra-abdominal adhesion is common, and the number of repeated CS is among the common factors related to their occurrence as reported in a study conducted by Kelly and colleagues, in USA where 46% of patients develop pelvic adhesive disease at the first cesarean delivery, 75% at their third cesarean delivery and 83% at their fourth cesarean delivery (6). Other authors reported also that, the occurrence of adhesion depends on the closure or not of the peritoneum during CS. Leftover blood, postoperative infections, tissue desiccation, and foreign substances during surgery are other factors reported(7,8).

On the other hand, the occurrence of intraperitoneal adhesion has been reported to increase the risk of birth outcomes such as damage to the bowel or bladder, hemorrhage, longer surgery duration, the risk of hysterectomy, infections, and adverse neonatal outcomes in cases of prolonged deliveries, among other factors (4,9).

Debate still exists on the best tool or approach to use to predict the occurrence of adhesion (10). Drukker and colleagues were the first to describe a novel technique using sliding signs on transabdominal ultrasound (US) to predict adhesions in pregnant women with repeated CS (11).

Ever since, additional researchers have noted that the ultrasound sliding sign, a noninvasive examination in which the uterus slides caudally against the muscles of the abdominal wall has demonstrated efficacy in predicting adhesion in patients with repeated CS, with a sensitivity and specificity as high as 100% (10,11). However, previous authors didn't include in their studies women with previous scars from other causes, such as laparotomy. In addition, some parameters, such as time of delivery and duration of surgery, were not assessed by previous authors.

However, the effectiveness remains ultrasonography sliding signs to predict adhesion and their related birth outcomes remains understudied in low-income countries, Tanzania included.

1.2. Problem statement.

Intra-abdominal adhesions were reported to increase morbidity and mortality in both neonates and mothers during caesarian sections due to the increased duration of surgery, bowel injury, and adverse birth outcomes, as reported in a study conducted in the Netherlands, USA and Germany where 19%, 6.3 % and 24% respectively of mothers with repeated CS experienced adverse birth outcomes (4,12,13,14). In low-income countries, similar findings are reported in Tanzania and Ghana, with intra-abdominal adhesions increasing rate of infant delivery time and maternal blood loss(15,16). However, the majority of authors did not establish a connection between the prevalence of unfavorable delivery outcomes and varying degrees of adhesion.

Furthermore, there is ongoing discussion regarding a reliable technique for predicting intra-abdominal adhesions in pregnant mothers who have had prior abdominal surgery.

The rate of intra-abdominal adhesion varies worldwide and ranges between 24% and 42% of intra-pelvic adhesion following the caesarian section. There are reports of a high rate in developing countries, with more than 67% of intra-abdominal adhesions occurring after CS, as seen in Nigeria utilizing an ultrasonography sliding sign (17–19). The previous findings were limited to mothers who had undergone repeated CS; they did not evaluate mothers who had undergone prior abdominal surgery or the role that other factors may have played in the occurrence of adverse surgical events. In Tanzania, the magnitude of intraabdominal adhesion among pregnant mothers with repeated abdominal or CS is still not well documented. A reliable tool for accurately predicting intra-abdominal adhesions in patients with previous scars may help reduce morbidity and mortality related to adhesions during a planned Caesarean section.

Prediction of adhesion using an ultrasonography sliding sign, which is a cheaper and noninvasive approach, remains understudied in low-income countries, including Tanzania.

This study aims to determine the proportion of intraperitoneal adhesions, their patterns, and related birth outcomes using an ultrasonography sliding sign in women with previous scars attending Mnazi Mmoja Hospital.

1.3. Rationale.

Pregnant women who have had abdominal surgery are at risk of developing adhesions, which can cause complications with subsequent surgeries like Caesarean sections (CS). Ultrasonography, which is an affordable, noninvasive, and available diagnostic modality, specifically in low-resource settings, can be used to predict or detect the presence of intraperitoneal adhesion in pregnant women at risk.

Early detection and precise diagnosis of intra-abdominal adhesions in pregnant women at risk may help the obstetrician prepare a multidisciplinary team (surgeon, pediatrician) for a better surgical approach to prevent or reduce complications related to adhesions such as bowel injury, neonate lacerations, and birth asphyxia, among others.

The findings of this study will contribute to the routine application of using ultrasonography sliding signs in pregnant women with previous abdominal surgery to detect intraperitoneal adhesions to control maternal and newborn complications.

1.4 Research questions.

1. What is the proportion of intra-abdominal adhesion using ultrasound among term pregnant women with previous scars attending Mnazi Mmoja Referral Hospital, Zanzibar, Tanzania?
2. What are the different patterns of intra-abdominal adhesion using Ultrasound among term pregnant women with previous scars attending Mnazi Mmoja Referral Hospital, Zanzibar, Tanzania?
3. What is the relationship between intra-abdominal adhesion and birth outcomes among term pregnant women with previous scars attending Mnazi Mmoja Referral Hospital, Zanzibar, Tanzania?
4. What is the difference in the grade of intra-abdominal adhesions using pre-operative ultrasonography sliding signs and intra-operative findings among term pregnant women with previous scars attending Mnazi Mmoja Referral Hospital, Zanzibar, Tanzania?

1.5 Objective of the study.

1.5.1 Broad objective.

To determine proportion, patterns of intra-abdominal adhesion using Ultrasound, and related birth outcomes among term pregnant women with previous scars attending Mnazi Mmoja Referral Hospital, Zanzibar, Tanzania.

1.5.2 Specific objectives.

1. To determine the proportion of intra-abdominal adhesion using an ultrasonography sliding sign among term pregnant women with previous scars
2. To describe different patterns of intra-abdominal adhesion using Ultrasound among term pregnant women with previous scars
3. To compare the grade of intraabdominal adhesions using pre-operative ultrasonography sliding signs and intraoperative findings among term pregnant women with previous scars
4. To determine the relationship between intra-abdominal adhesion and birth outcomes among term pregnant women with previous scars

CHAPTER TWO

LITERATURE REVIEW

2.1. Proportion of intra-abdominal adhesion using TVS in pregnant women.

Adhesions are fibrous bands of tissue that develop unnaturally between the surfaces of internal organs and tissues as a result of injury or inflammation. They are composed of fibroblasts, connective tissue, and occasionally blood vessels (20).

The existence of a thin connective tissue band that forms between two tissue or organ surfaces and is lysed by blunt dissection is the minimal criterion for the intraoperative diagnosis of adhesions. They involve different tissues such as the bowel, uterus, bladder, vesical-uterine pouch, and internal surface of the anterior abdominal wall (20–22).

Intra-abdominal adhesion formation results from increased extracellular matrix (ECM) formation, reduced matrix breakdown, and decreased fibrinolytic activity. Adhesion formation is induced by hypoxia when the body attempts to restore oxygen and nutrients to tissues that have been damaged by surgery or prior pathology. Pregnancy-related physiological changes favor decreased fibrinolysis and enhanced adhesion formation (7,15,23).

Although some of the particular molecular and cellular mechanisms behind adhesion development are generally understood, it is still unclear why adhesion development is less common after the Caesarian section than other abdominal surgeries (7,16,24).

Previously, no reliable tool or investigation could accurately estimate or detect intra-abdominal adhesion in pregnant women. Most surgeons used different strategies, such as skin scar visual characteristics and surgical history, to predict intra-abdominal adhesions.

The sonographic sliding organ sign, which is the relative motion between the abdominal and uterine walls as assessed by ultrasonography, has been demonstrated

to have a good predictive value for detecting pelvic adhesions in women following gynecologic surgery as well as in those with endometriosis, chronic pelvic inflammation, and infra-umbilical adhesions.

Drukker and colleagues were the first to prove the effectiveness of the sonography sliding sign in pregnant women planning a repeated caesarian section in Israel. In their cohort, they found that a negative sliding sign significantly predicts the presence of intra-abdominal adhesion, with a sensitivity of 56% and a specificity of 95%. In addition, Drukker and colleagues reported that a negative sliding sign was associated with a longer time from skin incision to delivery and bleeding, possibly reflecting more challenging surgery (14,17,25). However, Drukker and colleagues recruited only pregnant women who were planned for repeated caesarian sections. In Nigeria, Mohammed Bukar and colleagues reported a prevalence of 33.82% of intra-abdominal adhesion, with a sensitivity and specificity of 100% in determining the presence or absence of intra-peritoneal adhesions using TVS, Mohammed, and colleagues recruited the only participant planned for repeated CS with moderate to severe intra-abdominal adhesions.

Baro and colleagues also found a prevalence of 35% of intra-abdominal adhesions with a sensitivity of 76.2% and a specificity of 92.1% among pregnant women planned for repeated CS in Israel. However, Baro and colleagues used transabdominal ultrasonography to assess intraabdominal adhesion (26).

In contrast, Shu and colleagues in China observed that the ultrasonography sliding sign had lower sensitivity, specificity, and positive and negative predictive values, with values of 53.3%, 80.4%, 29.6%, and 91.8%, respectively, for intra-abdominal adhesion (27). However, Shu and colleagues conducted their study with a small sample size of 33 participants, which could not have been enough to reflect the general population.

Sonography sliding signs in pregnant women at risk of adhesion remain understudied in Tanzania. There is little published data that has been conducted in this field.

2.2. Patterns of intra-abdominal adhesions using TVS in pregnant women.

Intra-abdominal adhesions can be present in different forms following a caesarian section.

Adhesion can be classified as mild, moderate, or severe. Adhesions that are thin and filmy, with no vascular structures, and that are released by gentle, blunt, manual dissection are considered to be mild (5). Those that require sharp dissection but don't involve the bladder or bowel are considered moderate. Severe adhesions are those that make access to the lower uterine segment difficult, involving the bladder or bowel and require sharp dissection to release (14,28,29).

Ultrasonography sliding signs can also be used to predict or describe the different degrees or types of adhesion (14,26). Mild or absence of adhesion is suggested by a free movement of ≥2 cm in the longitudinal plane (positive sliding sign). It is moderate when the movement is between 1 and < 2 cm (positive sliding sign with restricted movement). It is severe when no sliding is observed, or longitudinal movement is less than 1 cm (negative sliding sign). There are scarce studies that have evaluated forms of intra-abdominal adhesion using ultrasonography sliding signs (17,26,30).

Mohammed Bukar and colleagues in Nigeria found that 5.97% of absent movement (severe adhesion), 29.85% of limited sliding (moderate adhesion), and 65% of free sliding (no or mild adhesion) in pregnant women planned for repeated CS. In addition, Bukar and colleagues found that TVS had a sensitivity of 65.0%, a specificity of 82.98%, a positive predictive value of 3.82, and a negative predictive value of 84.78% to predict moderate intra-abdominal adhesions. Also, they found high sensitivity and

specificity, respectively, at 25.0% and 98.41%, to predict severe adhesions using TVS(14).

A systematic review conducted by Shi and colleagues observed 49% of grade I adhesion, 24% for grade II, and 1% for grade III following CS. However, the findings of Shi and colleagues were from a systematic review, and the grading of adhesion was based on intraoperative findings.

Severe adhesions, especially those with multiple prior CSs, are frequently found between the lower uterine segment, urinary bladder, and anterior abdominal wall, preventing the uterus from sliding freely. Therefore, when sliding is absent, it is more objectively observed in the Ultrasound. As a result, severe adhesions are the type of adhesion that most studies report as being common and having the highest sensitivity (14,16,31).

2.3. Relation between intra-abdominal adhesions and birth outcomes.

There has allegedly been a connection between intra-abdominal adhesions and birth outcomes, as well as adverse surgical occurrences. Severe adhesions prolong operation time and are associated with lower umbilical artery cord gases, a lower Apgar score for newborns, and increased postoperative blood loss (14,32).

Morales and colleagues, in their systematic review, reported that progressively prolonged delivery times can lead to neonatal adverse outcomes. They observed that the length of the procedure depends on how many cesarean births have been performed previously, with the first cesarean birth delaying the delivery of the baby by 5.6 minutes, the second by 8.5 minutes, and the fourth by 18.1 minutes. In addition, Morales and colleagues noticed that the presence of dense adhesions was associated with umbilical artery cord gas pH 7.1 and lower 5-minute Apgar scores. However, the

findings of Sabol and colleagues were from a retrospective review of patients who underwent repeated C-sections (6).

The occurrence of adverse outcomes and incidental events during CS was reported to be related to the number of repeated CS, as observed in a study conducted by Saban and colleagues in Israel, where the presence of peritoneal adhesions was not associated with intra-operative organ injury, 5-minute Apgar scores, intrapartum death, or postpartum death at first repeated CS. However, repeated second caesarian sections complicated with adhesions were found to be associated with low (< 7) 1-minute Apgar scores (29).

On the other hand, the presence of severe adhesion increases the risk of fetal lacerations, with a rate ranging between 0.7 and 3.1 percent, with a peak incidence in emergency CS (29,33). The burden associated with repeated cesarean sections has been documented in the literature; however, several studies have paid little attention to the adverse birth outcomes and adhesions related to repeated C-sections.

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Study Design.

This prospective cohort study assessed full term pregnant women who delivered at (MMRH) in Zanzibar.

3.2. Study Area.

The study was carried out at Mnazi Mmoja Referral Hospital Zanzibar (MMRH). This facility is the National Referral and Teaching Hospital located in the Unguja urban district of Zanzibar. The hospital possesses a collective bed capacity of 600 beds and attends to approximately 1,000 outpatients on a daily basis. The study was carried out in the obstetrics and gynecology department, which offers both outpatient and inpatient care. Typically, patients scheduled for procedures using general anesthesia (GA) are admitted to the hospital wards. The department consists of four distinct wards: the antenatal ward, the postnatal ward, the labor ward, and the gynecology unit. In total, there are 72 beds available among these wards. Approximately 5,132 deliveries occur year, with 2,516 being performed through caesarean section. On average, there are 210 caesarean sections conducted each month. The department has 3 consultants, 7 specialists, 10 registrars, and 30 nurses, with 14 of the nurses serving as nurse midwives in the labor unit. The Labor ward is equipped with 6 delivery beds that offer ample privacy, 4 beds for post-birth observation, a resuscitation unit, and a nurse station. The department possesses a typical operating theatre comprising of 5 theatre rooms, out of which 3 are exclusively designated for caesarean deliveries. The theatre is staffed with two anesthesiologists, eight anesthetists, and 13 theatre nurses.

3.3 Target Population.

All full term pregnant women who underwent previous Caesarian section and abdominal surgery.

3.4. Study Population.

All Full-term pregnant women with previous scars planned for Caesarian at MMRH in Zanzibar and who will meet inclusion criteria.

3.5. Eligibility criteria

3.5.1. Inclusion Criteria

This study included all term pregnant women with at least a history of one Caesarian section or previous gynecological procedure: myomectomy.

3.5.2. Exclusion Criteria.

The following were excluded from the study:

- Patient below 18 years.
- Patient for emergency CS.
- Those with known collagen disease,
- Patient with previous non-gynecological abdominal surgeries.
- APH
- Patient who refuses to consent.

3.6. Sampling Design.

A consecutive sampling of pregnant women with previous scars for CS who were in their full term and planned for an elective cesarean at MMRH.

3.7. Sample size calculation.

Since, at the time of the proposed study, there is no available data on the prevalence of adhesion following gynecology obstetrical procedures using TVS in the Tanzanian population, the sample size will be determined using Slovin's formula as detailed by Ellen (25). According to the hospital records, the selected hospital registered an average of 285 cases (hospital records for 3 months) of planned repeated CS (July to September 2023) that corresponds to the data collection period; thus, the population under study for this period would be.

$$\textbf{Sample size } (N) = \frac{n_s}{1 + \frac{n_s - 1}{n}}$$

Here N: adjusted population size; ns: estimated sample size and n: population under study $N = \frac{344}{1+\frac{344-1}{285}} = 156$ Participants

The required sample size will be at 172 **participants** after accounting for a 10% loss of follow-up.

3.8. Sampling Technique.

All term pregnant women with previous scars identified and enrolled in the study after obtaining their consent until the required sample size during antenatal consultation at Mnazi Mmoja Referral Hospital meets the inclusion criteria from November 2023 to February 2024.

3.9. Patient recruitment and data collection.

The study recruited all pregnant women during their full term with previous CS who attended antenatal consultations at MMRH. A screening for eligible participants conducted in an antenatal clinic and eligible participants were identified and enrolled in the study after obtaining their consent until the required sample size was reached.

The information regarding demographic characteristics (age, residence, etc.) and clinical characteristics (number of previous CS, etc.) was collected from participants and files in a pretested questionnaire.

Abdominal ultrasonography was performed one day before the planned Caesarian section using the GE-Logic P6 ultrasound system (Toshiba Medical Systems, Japan) using a trans-vaginal 3.75 MHz transducer as part of the preoperative evaluation by the sonographers trained to perform USS.

Before performing the visceral sliding test, a preoperative US was performed as part of the departmental protocol to evaluate the fetus's biometrics and health.

The transducer was positioned midline, 3 cm above and perpendicular to transverse skin scars, or 8 cm above the superior margin of the pubic symphysis in midline infra umbilical skin scars. A plane in which the anterior uterine wall and anterior abdominal muscles obtained (9,10).

The patients are asked to inhale deeply and exhale while in this posture, and throughout two respiratory cycles, it was seen whether or not the uterine wall slides under the parietal peritoneum and fascia transversalis. On Android phones, video clips of current US photos are recorded, numbered, and preserved for inter-observer variability analysis. A sliding sign was said to be present when sliding of the uterus caudally against the abdominal wall muscles is seen (9,10).

The degree of sliding was assessed and a positive sliding sign was considered when free movement of ≥2 cm in the longitudinal plane was observed, which suggested no or mild intra-abdominal adhesions (9,10). A positive sliding sign with restricted movement was considered when movement between 1 and < 2 cm, which suggested of moderate adhesions, was made. A negative sliding sign is considered when no sliding is observed or a presence of longitudinal movement less than 1 cm is observed, which suggests a prediction of severe intra-abdominal adhesions (9,10).

Then a diagnosis of intraoperative findings is described based on the presence of mild, moderate, or severe adhesions. Mild adhesion will be those that are thin and filmy, with no vascular structures, and that are released by gentle, blunt, manual dissection (17). Moderate were those in which sharp dissection is required but doesn't involve the bladder or bowel. Severe adhesion will be those making access to the lower uterine segment difficult, involving the bladder or bowel, and requiring sharp dissection to release (17).

US findings on sliding signs and intraoperative adhesion findings were compared to assess whether the preoperative and intraoperative findings concurred (17).

Good neonatal outcome: neonates who will present an Apgar score > 7 in Other intraoperative and postoperative findings recorded were the following:

- Time of delivery of the fetus: duration from incision to extraction of the fetus.
- Lesions to the bowel and bladder
- Lacerations to the fetus.
- Blood loss will be estimated by the number of waited gauze.
- Good neonatal outcome: neonates who will present an Apgar score > 7 in 5 minutes
- Adverse neonatal outcome: neonates who present an Apgar score < 7 in 5 minutes, are admitted to the NICU and are still at birth.

3.10. Research Assistants

The principal investigator trained two research assistants, selected among obstetricians or residents in obstetrics, on how to record the relevant information and fill out the checklist. The training-oriented research assistants to pick and record information from antenatal consultation, abdominal ultrasound findings, intraoperative findings, and possible postoperative adverse outcomes.

3.11. Validity and Reliability.

The data collection tool underwent expert review and modification before being pretested at MMRH. After the pretesting, the tool was adjusted to verify that the questionnaires accurately gathered the data and were made clearer before the study began. The revised tool was then used by the principal investigator and the research assistants, who trained on the modes of documentation and their corresponding meanings for the data elements.

3.12. Variables.

Independent variables :

1. Demographic characteristics of the mother: age, residence, level of education,
2. Clinical characteristics number of abdominal surgeries
3. Intraoperative findings: bowel injury, bladder injury, lacerations of the neonate, time of fetal extractions.

Dependent variables :

1. Incidence of adhesion.
2. Patterns of adhesions.
3. Correlation adverse maternal (bowel injuries, bladder injuries, estimated blood loss, death) and neonatal birth outcomes (low Apgar score < 7; lacerations to the fetus, admission to the NICU) and adhesions.

3.13. Data Analysis

Data from questionnaires were entered and analyzed using SPSS software version 25.0., a statistical computer program. Continuous variables like the time of fetus delivery are summarized as means and medians, standard deviations, and the interquartile range. For categorical data, like types of adhesions, they were summarized as proportions, percentages, and frequencies.

Objective 1: The proportions of intra-abdominal adhesions among pregnant mothers with previous scars operated on at MMRH.

For objective 2, the different patterns of intra-abdominal adhesions are summarized as percentages and frequencies and depicted using a pie chart**.**

For objective 3, maternal and neonatal birth outcomes are categorized as good or adverse outcomes. The correlation was analyzed using binary logistic regression, reporting both odds ratios and P values. Variables with a P value ≤ 0.2 were reanalyzed at multivariate using backward stepwise binary logistic regression. Variables with P ≤ 0.05 are considered significant. The measure of the association reported using odd radio at a 95% confidence interval.

Objective 4: Comparison of the grade of intraabdominal adhesion using preop abdominal us and intraabdominal assessment done using the chi-square test. A p-value less than 0.05 will be considered significant.

3.11 Ethical Considerations.

The KU Senate of Research and Publication Committee granted the study ethical approval before it was carried out. At MMRH, the appropriate authorities were asked for permission before any data was collected. After receiving a patient's signed informed consent, enrollment began for all eligible patients who arrived at MMRH. Ineligible patients were not allowed to participate in this trial. The patient's identity was concealed by using numbers rather than names. Information that was acquired coded and entered into a computer for records. By assigning each file a unique password that is known only to researchers, security was maintained. Only researchers accessed the written forms, which were housed in a secure cabinet. The study did not interfere with the decision of the attending doctor. The study was conducted while observing the normal routine care process in the obstetrical department.

3.12. Dissemination plan.

As part of the requirements for the Master of Clinical Medicine in Obstetrics and Gynecology, a final report will be put together and given to the director of postgraduate studies at KU, the dean of the school of medicine, the director of clinical medicine services at KU, and the head of the department of obstetrics and gynecology. Additionally, this study will be shared by being presented at scientific meetings and published in a journal.

CHAPTER FOUR

RESULTS

4.1. Study participants.

in this study, 182 eligible pregnant mothers with previous abdominal surgery were selected to participle in the study at antenatal consultation at Mnazi Mmoja Referral Hospital in Zanzibar during the data collecting period. 10 participants refused to take part in the research. After contacting qualified subjects, the study's goal sample size of 172 was attained through sequential enrollment of eligible subjects.

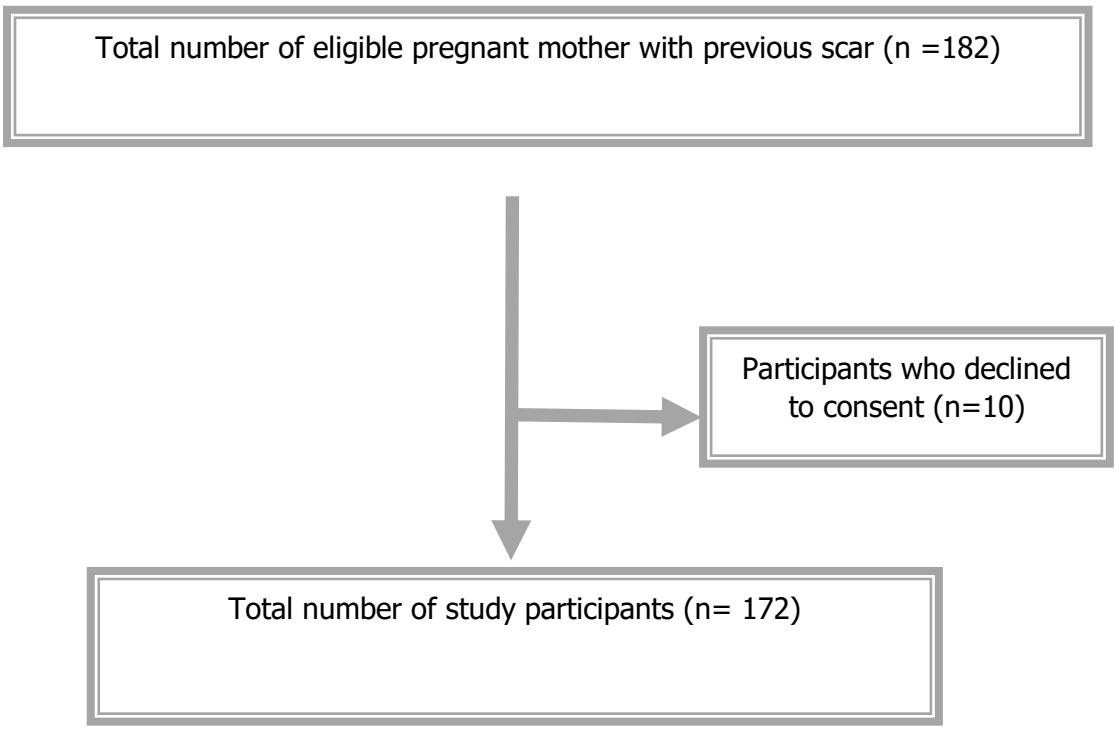

Figure 1: Flow charts of pregnant mothers with previous abdominal surgery attending MMRRH.

4.2 Sociodemographic characteristics of pregnant women with previous scars attending Mnazi Mmoja Referral Hospital.

Table 1: Sociodemographic characteristics of pregnant women with previous scars attending Mnazi Mmoja Referral Hospital.

Population Characteristics	**Freq (n=172)**	**Percent %**
Age(years)	30.75 (22,44)	
Residence		
Rural	58	33.7
Urban	114	66.3
Gestational age(weeks)		
37-40	167	97.1
> 40 Week	5	2.9
Level of education		
primary	65	37.8
secondary	92	53.5
university	15	8.7
The number of previous abdominal surgery.		
1	71	41.3
2	99	57.6
> 3	2	1.2
Indication of previous abdominal surgery		
Fetal distress	1	0.6
Previous CS	171	99.4
Estimation of blood loss		
< 500 ml (ref)	70	40.7
500– 1000 ML	90	52.3
>1000 ml	12	7.0
Apgar Score		
< 7	81	47.1
>7	91	52.9

In this study, most of the participants were from urban regions (66.3%) and were educated to secondary level (53.5%). Most of them had 2 previous cesarian sections (57.6%).

4.3. Proportion of intra-abdominal adhesion using an ultrasonography sliding sign among term pregnant women with previous scars attending Mnazi Mmoja Referral Hospital, Zanzibar, Tanzania.

In this study, the prevalence of intra-abdominal adhesion using USS was at 47.1 %.

Table 2: The proportion of intra-abdominal adhesions using USS among term pregnant women with previous scars attending MMRH

Intraabdominal adhesion	Frequency	Percentage %
Present	81	47.1
Absent	91	52.9

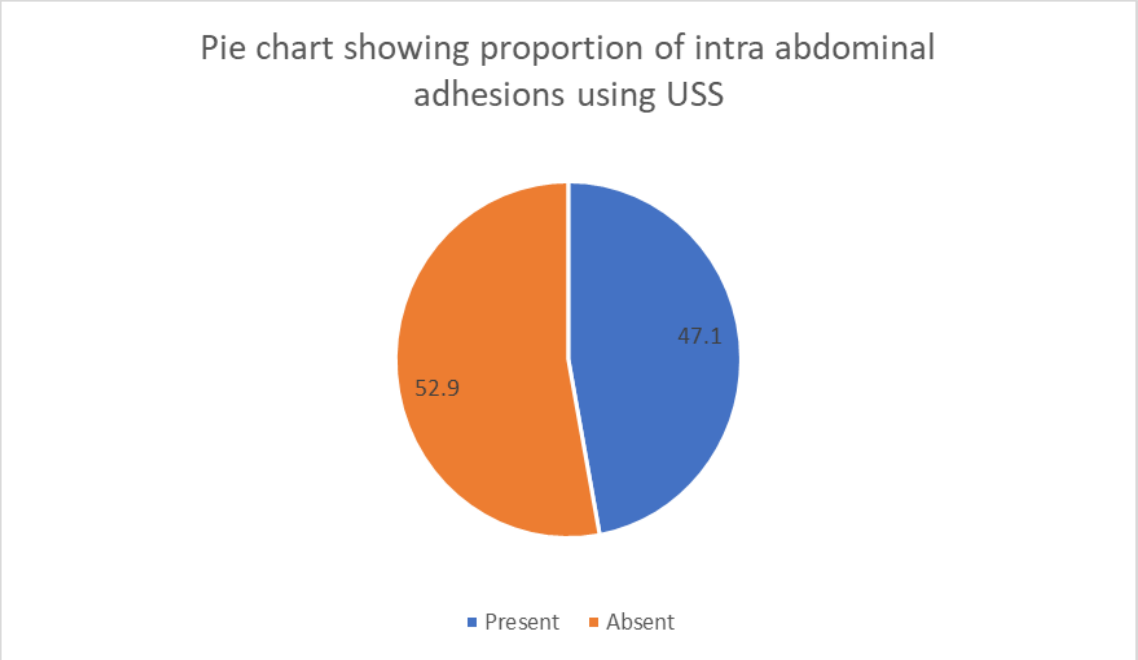

Figure 2: Pie Chart showing the distribution of the proportion of intraabdominal adhesion using USS.

4.4. Patterns of intra-abdominal adhesion using Ultrasound among term pregnant women with previous scars attending Mnazi Mmoja Referral Hospital, Zanzibar, Tanzania.

Table 3: Patterns of intra-abdominal adhesion using USS among term pregnant women with previous scars attending Mnazi Mmoja Referral Hospital

Patterns of intra-abdominal adhesions	Frequency	Percentage %
Absence of adhesions	91	52.9
Presence of adhesions	81	47.1
Moderate	61	35.5
Severe	20	11.6

In this study, moderate adhesions were the most prevalent (35.5%) when using USS.

11.6 % of patients also had severe adhesion.

4.6. Accuracy of USS to predict the grade of intraabdominal adhesions among term pregnant women with previous scars attending Mnazi Mmoja Referral Hospital, Zanzibar, Tanzania.

Table 4: Difference of intra-abdominal adhesions using preoperative USS and intra-operative findings.

Intrabdominal adhesions	**USS**	**Intra op findings**	**Sensitivity[#]**	**Specificity[#]**
Overall			67.5%	69.5%
Presence	81 (47%)	95 (55.2%)		
Absence	91 (53%)	77 (44.5%)		
Moderate			83.3%	95 %
Presence	61(35.5%)	73 (42.4%)		
Absent	111(64.5%)	118 (57.6%)		
Severe			83.3%	100 %
Presence	20 (11.6%)	23(13.4%)		
Absent	152(88.2)	149(86.6%)		

[#]Chi square test was used to determine accuracy and difference of USS.

In this study, USS has high specificity at 100 % and sensitivity of 83.3% to detect severe adhesion. On the other hand, USS had high sensitivity of 83.3 % and specificity of 95 % to detect moderate adhesion.

4.6. Relationship between intra-abdominal adhesion and birth outcomes among term pregnant women with previous scars attending Mnazi Mmoja Referral Hospital, Zanzibar, Tanzania.

Table 5: Relationship between intra-abdominal adhesion and birth outcomes.

Birth outcome	**Intra-abdominal**		**Bivariate analysis**		**Multivariate analysis**	
	Present	**Absent**	**OR (80% CI)**	**Sig**	**AOR (95% CI)**	**Sig**
Bowell injury	0(0.0)	172(100%)				
Bladder injury	1(50%)	1(50%)				
Time of fetal extraction						
Less than 5 min(ref)	40 (51.9%)	37(48.1%)				
5 -10 min	52(57.1%)	39(42.9%)	0.3(0.03,3.6)	0.3		
Above 10 min	3(75%)	1(25%)	0.4(0.04,4.4)	0.4		
Neonatal laceration	0(0.0)	172(100%)				
Fresh still birth	0(0.0)	172(100%)				
APGAR SCORE						
> 7	40(49.4%)	41(50.6%)				
< 7	55(60.4%)	36(39.6%)	1.3(1.1,1.7)	**0.04**	1.4(1.2-1.8)	0.04
Estimation of blood loss						
< 500 ml (ref)	48 (50.0%)	44(50.0%)				
500– 1000 ML	44(56.7%)	32(43.3%)	0.3(0.08, 1.3)	0.3		
>1000 ml	3(75%)	1(25%)	0.4(0.1,1.7)	0.5		
ICU admissions.						
Yes	12(70.6%)	5(29.4%)	2(0.7,6.1)	0.2		
No	83(53.3%)	72(46.5%)				

In the present study, neonates from mother with abdominals adhesion had significantly (p value less than 0.05) 1.3 risk to present with low Apgar score. There was a trend of ICU admission of neonates from mother with abdominal adhesion, but this was statically significant. Similar mother with abdominal adhesions had relative risk to blood loss moderate to severe and increase to time of fetal extraction above 5 minutes.

CHAPTER FIVE

DISUSSIONS, CONCLUSIONS AND RECOMMENDATIONS.

5.1. Introduction.

This was a prospective cohort study aimed to determine the proportion of intra-abdominal and they are different patterns using USS. In addition, the study aimed to determine the correlation between intrabdominal adhesions and birth outcome and to determine the accuracy of USS in the prediction of intra-abdominal adhesions among term pregnant women with previous scars attending Mnazi Mmoja Referral Hospital, Zanzibar, Tanzania.

5.2. Discussions.

In this study, the prevalence of intra-abdominal adhesion using USS was at 47.1 %. The proportion of intra-abdominal adhesions varies between nations across the world. The current prevalence was high compared to the findings of Mohamed and colleagues who reported a prevalence of 33.82% of intra-abdominal adhesion among pregnant women with previous scars and planned for elective repeated CS at the University of Maiduguri Teaching Hospital in Nigeria. This difference may be explained by the fact that Mohamed and colleagues Mohamed and colleagues had a smaller sample size of 65 participants which could have reduced the chance of getting patients with intrabdominal adhesion. Another study conducted by Baro and colleagues found a prevalence of 35% among pregnant mothers with previous scars planned for elective CS (26). In China, Wendy and colleagues reported also a low rate of 24 % of intra-abdominal adhesion using USS among 112 pregnant mothers planned for repeated CS in obstetrics unit in Hong Kong (27).

There is limited literature that has assessed intra-abdominal adhesion using USS, particularly in patients with previous abdominal surgery. Multifactorial considerations,

including interpersonal variability during evaluation, a different study population, and a different ultrasonography machine and brand, among many others, contribute to the reported differences in prevalence among different literatures.

On the other hand, in this study, majority of participants had moderate adhesions at a rate of 35.5% when using USS. Only 11.6 % of patients presented with severe adhesion. However, USS had high sensitivity and specificity to predict severe intra-abdominal adhesion respectively in 83 % and 100 %. This might be due to the fact that severe adhesions prevent the uterus from sliding freely and are often detected between the lower uterine segment, the anterior abdominal wall, and the bladder, especially in patients who have had several prior Caesarea sections. Hence sliding is more objectively seen in ultrasounds when it is missing (14,16).

Comparable findings were reported in several literature where moderate to severe adhesions were the most prevalent with the highest sensitivity when assessing intra-abdominal adhesions using USS. In Nigeria, Mohammed Bukar and colleagues similarly observed a comparable pattern, with moderate adhesion accounting for 29.85% of cases and severe adhesion for 5.97% of individuals (14). Furthermore, Mohammed et al. noted that the ability to predict severe adhesions had a high sensitivity of 25.0% and specificity of 98.41%. However, in comparison to our findings, this sensitivity was low. This could be caused by differences in the research populations between the two studies or interpersonal variability.

Drukker and colleagues in the USA observed similar findings with severe adhesions using USS having a sensitivity and specificity respectively of 56% and specificity of 95%. The sensitivity differs from what we observed and this disparity may have resulted from a variance in the grading of adhesions intraoperatively since multiple classification systems exist and unfortunately, none have been validated with clinical outcomes (11).

In Israel, Baro and colleagues reported also an overall sensitivity and specificity of USS at 76.2% and a specificity of 92.1%. However, Baro and colleagues did not grade adhesions (26).

In the current study, we found that neonates from mothers with abdominal adhesions had a significantly higher risk of presenting with a low Apgar score. This could be due to the increased time of fetal extraction, which may lead to fetal hypoxia, as seen in our findings (table 5), where the time of fetal extraction was more than 5 minutes in participants with intra-abdominal adhesion. On the other hand, neonates from mothers with abdominal adhesions had a trend toward ICU admission. The low Apgar score observed in neonates from mothers with abdominal adhesions might increase the risk of ICU admission, and mothers with abdominal adhesions also might increase the risk of ICU admission, and mothers with abdominal adhesions also had a relative risk of moderate to severe blood loss and an increase in the time of fetal extraction above 5 minutes.

These findings are in line with those of Morales and colleagues, in their systematic review which has found significant association between low birth asphyxia at 5 minutes in neonates from mothers with severe abdominal adhesions (6). However, the findings of Morales and colleagues were from a retrospective review.

Controversies results were reported by Saban and colleagues in Israel where they reported no association between low Apgar score at 5 minutes and intra-abdominal adhesion(29). However, they found a significant correlation between a low Apgar score at 1 minute and abdominal adhesion. Similar findings were reported by Tulandi and colleagues in Canada where he found also no significant difference in birth asphyxia and the presence of intra-abdominal adhesions.

The occurrence of unfavorable birth outcomes is complex and can be attributed to a variety of circumstances, including the technique employed, the procedure itself, and the surgeon's level of experience.

5.3. Study limitations.

In this study, despite efforts to minimize confounding variables, there may have been a small amount of interobserver variability throughout the assessment. Furthermore, this study was a single-based hospital study, its findings may not be applied to the general population.

5.4. Conclusions.

The proportion of intra-abdominal adhesions assessed using USS among pregnant women with previous scars attending MMRH was at 47.1 % which was relatively high compared to that reported in different literature. In addition, this study observed that USS is best tool to predict severe intraabdominal adhesion. On the other hand, intra abdominals adhesion was observed to increase the rate of adverse birth outcome from both mother and neonates such as in low Apgar score, increase the need for ICU admission, and increase the time of extraction during CS.

5.5. Recommendations.

The following are recommendations from this study:

- To do systematic preoperative assessment using sliding sign ultrasound for those pregnant mothers with repeated caesarean section who are at high risk of severe adhesions before attempting planned elective caesarean section for a better approach and minimize the occurrence of adverse birth outcome.

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APPENDICES

Appendix 1: Informed consent (English version)

Study Title: predictions of intra-abdominal adhesions using transvaginal ultrasonography sliding sign among third-trimester pregnant mothers attending antenatal consultation at Mnazi Mmoja referral hospital, Zanzibar.

Introduction:

Greetings! I am Dr. Chausiku Jumbe Darwesh, a postgraduate student undertaking Obstetrics and Gynecology at Hubert Kairuki Memorial University (KU). I am currently conducting a study with the title "Predictions of intra abdominals adhesions using transvaginal ultrasonography sliding sign among third-trimester pregnant mother attending antenatal consultation at Mnazi Mmoja referral hospital, Zanzibar." as part of my study requirements. As a result of this request for your participation and support in my study once my research assistant approaches you. Your care and management will not be impacted by your decision to participate or not. If you have any concerns about this study or do not understand something, please do not hesitate to ask them.

Aim of the study:

The purpose of this study is to determine the effectiveness of abdominal ultrasound in the prediction of intra-abdominal adhesions and related birth outcomes among pregnant mothers at Mnazi Mmoja Referral Hospital, Zanzibar, Tanzania.

Benefits:

Participating in this study does not directly benefit you or your child, but the findings could lead to better delivery management, which would then enhance mother and infant care.

Risks:

You may experience a little discomfort when practicing ultrasonography. Nonetheless, it cannot compromise the infant's or your safety.

What does this study involve?

In this study, structured questions will be posed to you, the patient, or your family members by the research assistant or lead investigator, and you will be required to fill out the prepared questionnaire with your answers. Additional data will be acquired by ultrasonography investigation and clinical examination; the management will be taken from your hospital file and entered into the organized clinical form.

Consent:

Your consent to be enrolled in the study is entirely voluntary and amenable by signing the consent form. You are free not to consent and this will not affect the care and management offered to your patient. You may decide to stop participating in this study at any time for any reason**.**

Confidentiality:

The information you provide is extremely respected and will be preserved strictly confidential. The study information will be stored in protected computer files and paper records stored in a locked filing cabinet. Only study staff will have access to the information.

Access to information:

By signing this form, you allow the research team to use the information and give it to others involved in the research. The research team includes the researcher, facilitators plus others working on this study at Kairuki University.

Who to contact:

1. The Principal Investigator,

   Dr Chausiku Jumbe Darwesh,

   Obstetrics and Gynaecology Department,

   KU,

   P. O. Box: 65300

   Dar es Salaam, Tanzania.

   Tel: +255777303633

   Email: chausikujumbe@gmail.com

1.4. Supervisor,

Senior Lecturer,

Department of Obstetrics and Gynecology,

P.O.BOX 65300,

Dar es Salaam, Tanzania.

Tel: 0713618847

I, _____ have read/been told the contents of this form. My questions have been answered. I agree to participate in this study.

Signature of participant _____

Date of signed consent _____

Appendix II: Consent form (Swahili Version)

Fomu ya ridhaa ya kushiriki katika utafiti

Utangulizi:

utabiri wa kuangalia mshikamano ndani ya fumbatio kwa kutumia mashine ya altrasound kwa wa mama wajawazito waliotimia mienz tisa wanaohudhuria katika kliniki ya wajawazito katika hospitali ya rufaa ya Mnazi Mmoja, Zanzibar.

Madhumuni ya utafiti:

Kushiriki katika utafiti huu hautokufaidisha wewe au mtoto wako moja kwa moja, lakini matokeo yanaweza kusababisha usimamizi bora wa kujifungua, ambao utaimarisha utunzaji wa mama na mtoto.

Utafiti huu unahusisha nini?

Katika utafiti huu, maswali yaliyopangwa utaulizwa wewe, mgonjwa, au wanafamilia yako na msaidizi wa utafiti au mpelelezi mkuu, na utahitajika kujaza dodoso lililotayarishwa na majibu yako. Data ya ziada itapatikana kwa uchunguzi wa ultrasonografia na uchunguzi wa kimatibabu; usimamizi utachukuliwa kutoka kwa faili yako ya hospitali na kuingizwa katika fomu ya kliniki iliyopangwa.

Hatari /Athari:

Unaweza kupata usumbufu mdogo wakati wa kufanya mazoezi ya ultrasound. Hata hivyo, haiwezi kuhatarisha usalama wa mtoto au mtoto wako.

Faida za utafiti:

Kushiriki katika utafiti huu hakukufaidi wewe au mtoto wako moja kwa moja, lakini matokeo yanaweza kusababisha usimamizi bora wa kujifungua, ambao utaimarisha utunzaji wa mama na mtoto.

Haki ya kutoshiriki:

Idhini yako ya kujiandikisha katika utafiti ni ya hiari kabisa na inakubalika kwa kusaini fomu ya idhini. Uko huru kutokubali na hii haitaathiri utunzaji na usimamizi unaotolewa kwa mgonjwa wako. Unaweza kuamua kuacha kushiriki katika utafiti huu wakati wowote kwa sababu yoyote ile.

Usiri:

Maelezo unayotoa yanaheshimiwa sana na yatahifadhiwa kwa siri kabisa. Taarifa za utafiti zitahifadhiwa katika faili za kompyuta zilizolindwa na katika rekodi za karatasi zilizohifadhiwa kwenye kabati iliyofungwa. Wafanyakazi wa utafiti pekee ndio watapata taarifa.

Ufikiaji wa habari:

Kwa kusaini fomu hii, unaruhusu timu ya utafiti kutumia taarifa na kuwapa wengine wanaohusika katika utafiti. Timu ya utafiti inajumuisha mtafiti, wawezeshaji pamoja na wengine wanaoshughulikia utafiti huu katika Chuo Kikuu cha Kairuki.

Ukiwa na swali au tatizo lolote, unaweza kuwasiliana na wafuatao:

1. Mkurugenzi wa huduma za utafiti,
   Kairuki University,
   Box 65001.Dar es Salaam Tanzania.
   Tel:
2. Mtafiti Mkuu,
   Dr. Chausiku Jumbe Darwesh,
   Obstetrics and Gynecology Department,
   KU,
   P. O. Box 65300, Dar es Salaam, Tanzania.
   Tel: 0777303633.
   Email: chausikujumbe@gmail.com

2. Msimamizi,

   Dr. Monica Chiduo,

   Senior Lecturer,

   Department of Obstetrics and Gynecology,

   P.O.BOX 65300, Dar es Salaam, Tanzania.

   Tel: 0713618847.

Kuweka sahihi ya makubaliano:

Mimi, _____, nimesoma/nimesomewa maelezo yote yaliyomo kwenye fomu hii na nimeelewa. Maswali yangu yamejibiwa vizuri na niko tayari kushiriki.

Sahihi ya mshiriki _____

Sahihi ya Mtafiti _____Tarehe _____.

Appendix III: Checklist

PREDICTIONS OF INTRA-ABDOMINAL ADHESIONS USING ABDOMINAL ULTRASONOGRAPHY SLIDING SIGN AMONG THIRD-TRIMESTER PREGNANT MOTHERS ATTENDING ANTENATAL CONSULTATION AT MNAZI MMOJA REFERRAL HOSPITAL, ZANZIBAR

Date of interview .....

PART I: SOCIAL DEMOGRAPHIC INFORMATION

1. Age of the participant in a year:
2. Residence

   a). ☐Urban

   b). ☐Rural

3. Level of education.

a) ☐ primary.

b) ☐ secondary.

c) ☐ university.

1. Gestational age (weeks)

   a) ☐37-40 weeks

   b) ☐> 40 weeks.

Part II. CLINICAL INFORMATION.

1. Number of previous c-sections.

   a) ☐ 1

   b) ☐2-3

   c) > 3

2. Indication of previous C section:

a) ☐Fetal distress.

b) ☐ Repeated CS

3. Ultrasonography findings.

a) ☐ Positive sliding sign

b) ☐ Positive sliding sign with restricted movement.

c) ☐ Negative sliding sign

4. Intraoperative findings.

a) ☐ Presence of adhesions.

b) ☐ Absence of adhesions.

5. Degree of adhesions

a)

b)

c)

6. Intraoperative events:

a) ☐ Bowel injury.

b) ☐ Bladder injury.

c) ☐Time of fetal extractions(minute): ☐ < 5, ☐5-10, ☐>10.

d) Estimated blood loss in ml: ☐ < 100, ☐100-500,>500.

7. Neonatal information.

a) ☐ Lacerations of neonate.

b) Apgar score: ☐ > 7, ☐ < 7

c) ☐ Fresh stillbirth.

d) ☐ Admissions NICU.

SEHEMU YA I: TAARIFA ZA KIDEMOGRAFIA KIJAMII

1. Umri wa mshiriki katika mwaka:

2. Makazi

a). ☐Mjini

b). ☐Vijijini

3. Kiwango cha elimu.

a) ☐ msingi.

b) ☐ sekondari.

c) ☐ chuo kikuu.

2. Umri wa ujauzito (wiki)

a) ☐wiki 37-40

b) ☐> Wiki 40.

Sehemu ya II. HABARI ZA KITABIBU.

1. Idadi ya sehemu ya c iliyopita.

a) ☐ 1

b) ☐2-3

c)> 3

2. Dalili ya sehemu ya C iliyotangulia:

a) ☐Mfadhaiko wa fetasi.

b) ☐ CS inayorudiwa

3. Matokeo ya Ultrasound.

a) ☐ Alama chanya ya kuteleza

b) ☐ Alama chanya ya kutelezesha iliyo na mipaka ya kusogea.

c) ☐ Alama hasi ya kuteleza

4. Matokeo ya upasuaji wa ndani.

a) ☐ Kuwepo kwa mshikamano.

b) ☐ Kutokuwepo kwa mshikamano.

5. Kiwango cha adhesions

a)

b)

c)

6. Matukio ya ndani ya upasuaji:

a) ☐ Kuumia utumbo.

b) ☐ Jeraha la kibofu.

c) ☐Muda wa utoaji wa fetasi(dakika): ☐ <5, ☐5-10, ☐>10.

d) Kadirio la upotezaji wa damu katika ml: ☐ <100, ☐100-500,>500.

7. Taarifa za watoto wachanga.

a) ☐ Kuchanja watoto wachanga.

b) Alama ya Apgar : ☐ > 7, ☐ <7

c) ☐ Kuzaliwa upya.

d) ☐ Viingilio NICU.

Appendix IV: Permission Letter

REVOLUTIONARY GOVERNMENT OF ZANZIBAR

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Website: www.zahri.go.tz
Postcode: 72208, Binguni
Street: Binguni – Zanzibar
Tel: +255(0) 776 264 880
Email: zahrec@zahri.go.tz

Ref: NO. ZAHREC/02/ST/MAY/2024/88 07th May, 2024

Chausiku Jumbe Darwesh,
Student Researcher,
Hubert Kairuki Memorial University.

RE: ETHICAL CLEARANCE FOR CONDUCTING HEALTH RESEARCH IN ZANZIBAR

This is to certify that the research protocol titled **"Predictions of intra-abdominal adhesions using ultrasonography, sliding sign, and birth outcomes among term pregnant mothers with previous scar attending antenatal clinic at Mnazi mmoja referral Hospital, Zanzibar"** was received and reviewed on the 22nd of April, 2024.

We would like to inform you that your proposal has been **"Approved"** for implementation.

Sites of Research: Mnazi Mmoja Referral Hospital.
The Principal Investigator has to:

i. Submit your progress report and a final report upon completion of Research.
ii. Seek permission for Publication of results from ZAHREC.
iii. Submit Copies of the final Publications to ZAHREC.
iv. Seek approval for any changes made to the approved protocol prior to their implementation

Any researcher who deviates or fails to comply with these conditions shall be guilty of an offense and shall be liable for **Six months: 07/05/2024 - 06/11/2024**

Thanks in advance,

ZANZIBAR HEALTH RESEARCH INSTITUTE
10 MAY 2024
P.O. Box 236, ZANZIBAR

Dr Mayassa S. Ally,
CHAIR- HRCC,
ZANZIBAR HEALTH RESEARCH INSTITUTE,
BINGUNI,
ZANZIBAR.

Amour S. Mohamed,
DIRECTOR GENERAL,
MINISTRY OF HEALTH,
ZANZIBAR.

HUBERT KAIRUKI MEMORIAL UNIVERSITY (HKMU)

70 Chwaku Street,
Mikocheni,
P.O BOX 65300,
Dar es Salaam,
Tanzania.

Tel: +255-22-2700021/4
Fax: +255-22-2775591
Email: irec@hkmu.ac.tz
Website: www.hkmu.ac.tz

Ref. No. HKMU/IREC/27.10/437 **09th April 2024**

Chausiku Jumbe Darwesh,
Hubert Kairuki Memorial University,
P.O. Box 65300,
Dar es Salaam, Tanzania.

RE: ETHICAL CLEARANCE CERTIFICATE FOR CONDUCTING HEALTH RESEARCH.

I am pleased to inform you that the research titled: **Predictions of Intra-Abdominal Adhesions and Their Patterns Using Ultrasonography Sliding Sign and Birth Outcomes Among Terms Pregnant Mother with Previous Scar Attending Antenatal Clinic at Mnazi Mmoja Referral Hospital, Zanzibar (Darwesh C. J., 2024)** has been granted ethical approval.

This approval is in effect for one year from the above date. Any changes in the procedures should be reported to the Institutional Research Ethics Committee. Significant changes will require the submission of a revised request for ethical approval. You will be required to submit **study progress report** every six months.

Permission to publish your findings should be sought from the National Institute for Medical Research (NIMR) before submission to a publisher and not concurrently.

CHAIR PERSON

Name: Prof. Fredrick Kaijage

Signature:

SECRETARY

Name: Prof. Columba Mbekenga

Signature:

HUBERT KAIRUKI MEMORIAL UNIVERSITY
P. O. Box 65300
DAR ES SALAAM

WizarayaAfya
Vuga-Zanzibar.

HOSPITALI YA RUFAA MNAZI MMOJA

ZANZIBAR

Simu: +255 773 833768
Baruapepe: info@mmh.go.tz
Tovuti: www.mmh.go.tz
Sanduku la Posta: 672

Tarehe: 28 / 5 /2024

Nd Chausiku Jumbe Darwesh
Mwanafunzi/Mfanyakazi Mtafiti
Chuo/Ofisi/Hospitali Hubert Kairuki

KUH: RUHUSA YA KUFANYA UTAFITI.

Mada ya hapo juu inahusika na barua hii.

Ombi lako la kuja kudadisi baadhi ya wagonjwa/wafanyakazi kwa lengo la kulamilisha utafiti huo limepokewa na kuzingatiwa. Ruhusa imetolewa kuja kwa ajili ya udadisi huo unaohusiana na:

Prediction Of Intra-Abdominal Adhesions Using Utrasonography, Sliding Sign And Birth Outcomes Amongs Term Pregnant Mothers With Previous Scar Attending Antenatal Clinic At Mnazi Mmmoja Referral Hoapital, Zanzibar.

kuanzia tarehe ya barua hii kwa muda wa mwezi mmoja.

Unatakiwa kuwasilisha matokeo ya utafiti wako ofisini kwa Mkurugenzi Mtendaji mara baada ya kazi ya uandishi wa ripoti hiyo kumalizika na kuwasilisha kwenye Taasisi husika.

Unatakiwa kuvaa Kitambulisho chako muda wote wa kazi hii kwenye maeneo ya hospital. Pia uwe na kopi ya barua hii. Kutokana na upungufu wa wafanyakazi hospitalini hapa huruhusiwi kutumia wafanyakazi wa hospital kwa kazi yako hii.

Natanguliza shukurani za dhati kwa mashirikiano

Ahsante

Hafidh Sheha Hassan
/Mkurugenzi Mtendaji,
MnaziMmoja Hospital,
Zanzibar

Nakla:
- Mkuu wa Idara HMM

HUBERT KAIRUKI MEMORIAL UNIVERSITY (HKMU)

70 Chwaku Road,
Regent Estate - Mikocheni,
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Tanzania

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***Fax:** +255-22-2775591*
E-mail:secvc@hkmu.ac.tz
Website:www.hkmu.ac.tz

Ref. No. HKMU/PT/30.5/438

15th April 2024

Medical Officer Incharge,
Mnazi Mmoja Referral Hospital,
Zanzibar.

Re: Letter of introduction Dr. CHAUSIKU JUMBE DARWESH (MMED Part 2 – Obstetrics and Gynaecology)

The above named is a MMED postgraduate student specialising in Obstetrics and Gynaecology. As part of fulfilling her MMED programme, she plans to undertake a study titled **PREDICTIONS OF INTRA ABDOMINAL ADHESIONS AND THEIR PATTERNS USING ULTRASONOGRAPHY SLIDING SIGN AND BIRTH OUTCOMES AMONG TERMS PREGNANT MOTHER WITH PREVIOUS SCAR ATTENDING ANTENATAL CLINIC, AT MNAZI MMOJA REFERRAL HOSPITAL, ZANZIBAR.** This study was reviewed and has been granted with an ethics approval No. **HKMU/IREC/27.10/437** by the HKMU Institutional Research Ethics Committee that will be valid for one year with effect from 9th April, 2024.

This letter serves to introduce **Dr. CHAUSIKU JUMBE DARWESH** who will be conducting her study at **Mnazi Mmoja Referral Hospital in Zanzibar**, please accord her with the needed support.
Thank you for your support and cooperation in developing human resources for health in our country.

Regards,

Professor Columba Mbekenga, PhD
Director Postgraduate Studies & Research Institute

DIRECTOR POSTGRADUATE STUDIES AND RESEARCH INSTITUTE
HUBERT KAIRUKI MEMORIAL UNIVERSITY
P. O. Box 65300, DSM

c. c. Professor Naboth Mbembati, Dean, Faculty of Medicine, HKMU
c. c. Dr. Monica Chiduo, Chair, Department of Obstetrics and Gynaecology, HKMU.

SERIKALI YA MAPINDUZI YA ZANZIBAR
AFISI YA MAKAMU WA PILI WA RAIS,

22279 Barabara ya Vuga,
Vuga, S.L.P. 239,
70460 Mjini Magharibi, Zanzibar

Tovuti : www.ompr.go.tz
Barua pepe : Info@ompr,go,tz
Faksi : 0242231826

CA.33/411/01L/51 **23/04/2024.**

MKURUGENZI MTENDAJI,
HOSPITALI YA RUFAA MNAZI MMOJA,
ZANZIBAR.

KUH: RUHUSA YA KUFANYA UTAFITI

Kwa heshima, naomba uhusike na mada ya hapo juu.

Serikali ya Mapinduzi ya Zanzibar imemruhusu **Ndg. Chausiku Jumbe Darwesh** mwanafunzi kutoka **Chuo cha Kumbukumbu ya Hurbert Kairuki (HKMU)** anaesomea **Shahada ya Uzamili** katika fani ya ***Obsetic And Gyaecology*** kufanya utafiti katika mada inayohusiana na **"Prediction of Intra-Abdominal Adhesions Using Ultrasonography, Sliding Sign And Birth Outcomes Among Term Pregnant Mothers With Previous Scar Attending Antenatal Clinic at Mnazi Mmoja Referral Hospital, Zanzibar".** Utafiti huo utafanyika hapo Hospitali ya Rufaa Mnazi Mmoja, Zanzibar kuanzia tarehe **23/04/2024** mpaka **23/07/2024.** Tunaomba asaidiwe ili aweze kukamilisha utafiti huo.

Kwa nakala ya barua hii mara baada ya kumaliza utafiti, mtafiti anatakiwa kuwasilisha nakala (copy) 3 za ripoti ya utafiti huo, Afisi ya Makamu wa Pili wa Rais - Zanzibar.

Naambatanisha na kivuli cha kibali cha kufanyia utafiti.

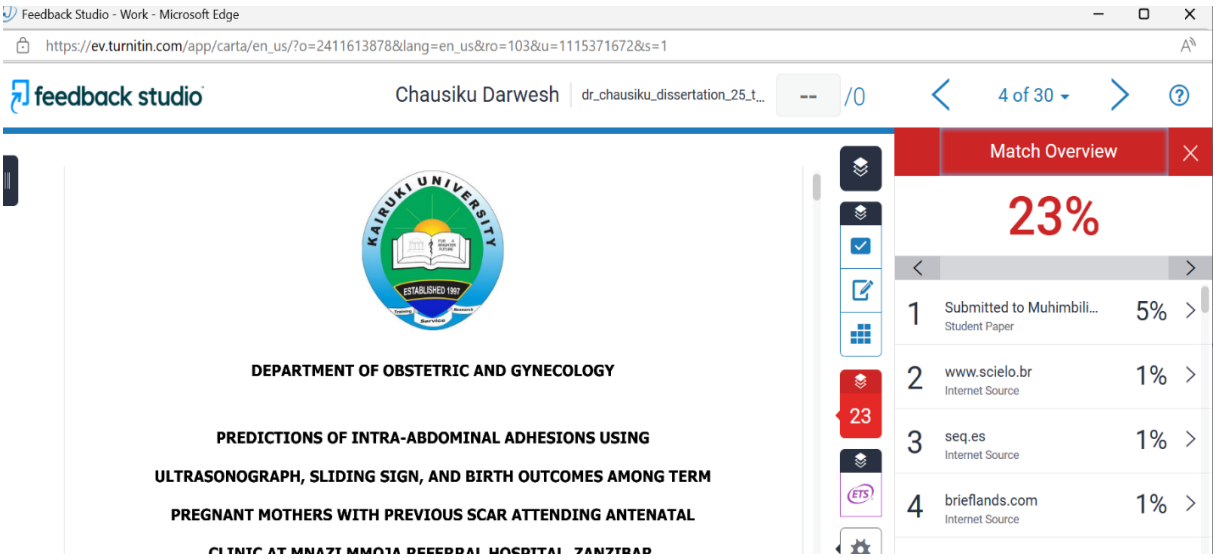
Wako mtiifu,

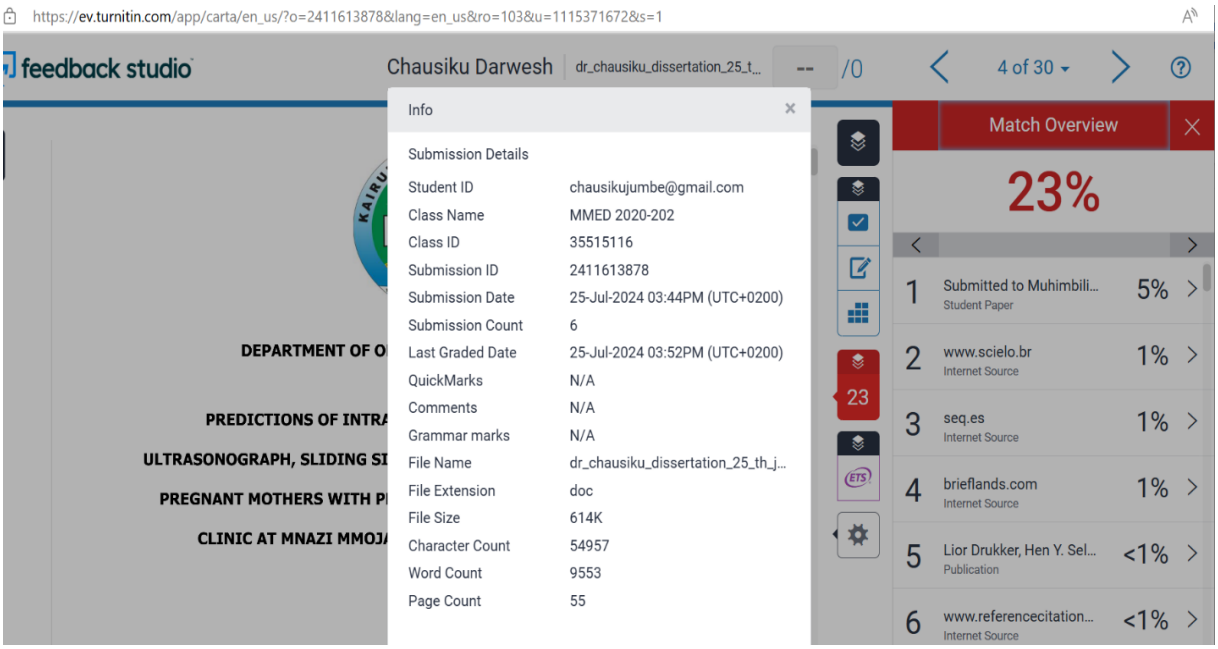
Siajabu S. Pandu

SIAJABU S. PANDU,
/KATIBU MKUU,
AFISI YA MAKAMU WA PILI WA RAIS,
ZANZIBAR.

NAKALA: Ndg. Chausiku Jumbe Daruesh (0777 303633).

Appendix V: Plagiarism Report





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KAIRUKI UNIVERSITY

DEPARTMENT OF OBSTETRIC AND GYNECOLOGY

PREDICTIONS OF INTRA-ABDOMINAL ADHESIONS USING ULTRASONOGRAPH, SLIDING SIGN, AND BIRTH OUTCOMES AMONG TERM PREGNANT MOTHERS WITH PREVIOUS SCAR ATTENDING ANTENATAL CLINIC AT MNAZI MMOJA REFERRAL HOSPITAL, ZANZIBAR.

By

CHAUSIKU JUMBE DARWESH

SUPERVISOR: DR MONICA CHIDUO

CO-SUPERVISOR: DR BONIFACE SYLVESTER

Dissertation submitted to the Faculty of Medicine in partial fulfilment of the requirements for the degree of Master of Medicine in Obstetrics and Gynecology of Kairuki University

July 2024