

**SEXUAL ACTIVITY IN THE LAST TWO WEEKS OF PREGNANCY AND
PREGNANCY OUTCOMES IN WOMEN BEYOND 28 WEEKS GESTATION**

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DECLARATION

I hereby declare that this proposal is my original work. It was developed by me, with the guidance of my supervisors, senior members of the department of Obstetrics and Gynaecology, University of Nairobi. It has not been submitted to any other university for a degree award.

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DEFINITION OF TERMS

Coitus: physical union of male and female genitalia accompanied by rhythmic movements. Synonymous with sexual intercourse.

Sexual activity: actions related to or involving sex (coitus). Sexual intercourse, involving penile vaginal penetration, without a barrier (unprotected).

Premature rupture of membranes: drainage of amniotic fluid before 37 completed weeks of gestation.

Placenta praevia: placenta found in the lower part of the uterus that partially or completely covers the cervical os.

Multiple gestations: a pregnancy that contains more than one viable foetus.

Trimester: a period of three or about three months especially one into which a woman's pregnancy is often divided.

Preterm delivery: onset of labour and delivery of a pregnancy before 37 completed weeks.

Sexuality: a comprehensive concept that combines physical capacity for sexual arousal/ libido, and the personal and social meanings attached to sexual behaviour and development of sexual and gender identities.

ABSTRACT

Introduction: Sexual activity, an important aspect of obstetrics and gynaecology and sensitive topic requires a positive respectful approach. It has been widely studied, except in Africa, to determine whether there are any effects of sexual intercourse during pregnancy, on labour and delivery outcomes.

Objectives: To find out effects of sexual activity on pregnancy outcomes and socio demographic influences.

Study design: This study is a comparative cross-sectional study, in which 180 women who engage in coitus during the last 2 weeks of pregnancy were compared to 180 women who do not, and pregnancy outcomes determined.

Study area and population: The study was carried out at the Kenyatta National Hospital in the postnatal wards.

Data collection and analysis: Data was collected both from interviews and medical records of patients. The analysis was undertaken using SPSS version 18 in which Univariate descriptive analysis and bivariate analysis was carried out. Socio – demographic characteristics of the participants formed the independent variables.

Results: Women aged 30 and were most likely to engage in intercourse in the final weeks of pregnancy compared to younger women: 20-24 years (OR = 3.03, $p = 0.043$), 30 or more years (OR 3.73, $p = 0.016$). Mothers who had more than one living child were more likely to report engaging in sexual intercourse (2 children; OR = 2.07, and 3 or more children 2.71). Women who reported sexual intercourse in the last two weeks of pregnancy were more likely to deliver their babies before the expected date of delivery OR 1.67 ($p = 0.028$). The caesarean section rate in mothers who had reported sexual activity prior to delivery was 24.4% compared to 38.3%, OR = 0.52, ($p = 0.005$).

Discussion: This study found that women over 30 years were three times more likely to engage in sexual intercourse than their younger counterparts. 64.4% of women who reported sexual activity in the last two weeks of pregnancy went into labour before their expected date of delivery compared with 50% of those with no sexual contact. Complications in those who reported sexual activity were low 2.2% for bleeding, and 5.7% for drainage of liquor and 20% for vaginal discharge in pregnancy. The number of live children, influenced whether the respondent had sexual intercourse. Education and occupation did not influence the sexual activities of women in the last two weeks of pregnancy. Marital status and living arrangement were found to be determinants of sexual activity in pregnancy. There were no significant differences in length of the various stages of labour.

Conclusion: Sexual activity in the last two weeks of pregnancy is more likely to occur in those older than 30 years who have 2 or more live children. In terms of outcomes, those who engage in intercourse are more likely to go into labour before the expected date of delivery and may also have a reduced chance of requiring caesarean section delivery. Neonatal outcomes showed no significant difference in those who engage in sexual activity compared to those who do not. The low occurrence of adverse effects found in this study corresponds with the recommendation that sexual activity in pregnancy should not be discouraged in low risk pregnancies.

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INTRODUCTION

Sex and sexual activity in general is a sensitive topic rarely discussed in public or private forums. However, it forms a large part of the basis of reproductive health, and is therefore important in obstetrics and gynaecology in patients who are or are not pregnant(1). One of the basic rights in sexual health is the right to information and education(2), and access to this may be best provided by the healthcare worker. The healthcare worker must therefore be well informed about sexual activity and its effects and be able to have a candid discussion with the patients he/ she attends to. Studies must therefore be carried out to get this information, especially for the specific population that the healthcare worker is managing.

Sexual functioning in women who are pregnant is influenced by culture(3), physiological and physical changes of pregnancy(4), social, religious and emotional factors(5). In certain cultures in Africa, like Tunisia, sexuality is considered a taboo(6). However, in others (certain parts of Nigeria), women generally have a positive attitude towards sexuality, that is they are not averse to sexual contact and/ or experiences during pregnancy (7,8). In Taiwan, few women have a positive attitude towards sexual activity in pregnancy(5).Female sexual desire/ libido is known to be reduced in pregnancy with the most significant reduction in the third trimester(4,5,9).

The effects of sexual intercourse on pregnancy especially late pregnancy and pregnancy outcomes are variable. Some studies indicate no effect such as earlier onset of labour, rupture or membranes, foetal distress,(10) while others show a beneficial result on term pregnancies like shorter labour and less need for caesarean delivery (11) and on preterm pregnancies such as reduced risk of preterm labour(12). In a study done in Nigeria sexual intercourse frequency was noted to be at about 1.5 times a week, reduced from pre-

pregnancy levels of 2.3 times a week.(7) Similar findings were found in a Kenyan study on sexual activity in pregnancy(13), where sexual intercourse was noted to continue into the third trimester.

The physiological effects of sexual activity include peripheral vasocongestion, increase in heart rate and increased alpha wave brain activity in the arousal phase. Plateau phase involves continued vasocongestion, increased muscle tone and increased vaginal lubrication. The orgasmic phase is associated with rhythmic contractions of pelvic muscles and uterine and anal sphincter muscles as well. Uterine contractions occur at about 0.8sec intervals and last 3-15secs(13,14), the uterine contractions may be more frequent for up to 90minutes(15). During orgasm, the intra-uterine pressures rise to 40cm H₂O at the peak, then there is a rapid fall in pressure to negative 26cm H₂O, creating an 'in-suck'. These changes in pressure are believed to assist the sperm to travel into the uterus(16). In females with orgasm, there is also an associated clouding of consciousness, and sense of peace and relaxation possibly due to the effects of oxytocin(17). These have not been shown to have any effect on the pregnancy(18,19). However, the onset of labour may occur earlier when patients engage in sexual intercourse at term where it has been shown that women who had sexual intercourse in the last week of pregnancy had a significantly lower gestational age at delivery than those who did not(20,14). In the third trimester, the uterus is known to have a greater number of receptors to oxytocin (one of the hormones that plays a role in labour), making it more susceptible to the effects of oxytocin.

LITERATURE REVIEW

Sexual problems during pregnancy may have a negative effect on marital bonds developed by a couple. If the couple has an unsatisfying relationship it can affect attitudes

and sexual activity and enjoyment during pregnancy(21). Sexual dysfunction can affect a woman's quality of life due to self-esteem issues(14). Other influencing factors like culture(3), are important in that they affect the sexual behaviour of couples, influencing when and/or whether sexual intercourse takes place(22) and this affects the relationship of the couple(23). Thus, sexuality is an important subject during the assessment of couples who attend the antenatal clinics. The emotional effects may affect the woman's experience of labour and delivery whether positive or negative.

In the history of obstetrics, in the early 1900s, coital activities were discouraged in pregnancy. This was done in reference to the bible and the fact that pregnant animals were not seen to have intercourse, and as such coitus in pregnancy was seen as unnatural(24). The practice did not change much over the years, however, in the 1970's the trend was to stop coitus six weeks before to six weeks after delivery(25). It is not clear whether couples adhered to these recommendations.

Currently in normal pregnancies, sexual intercourse is not contraindicated and may proceed as often as the couple may like(19). This is affected by the physiological, physical and emotional changes that occur in pregnancy(26). Most studies on coitus in pregnancy are cross-sectional studies done by using the sexual function index, and frequency of sexual intercourse which show a general decline in sexual activity in pregnancy and sexual satisfaction as compared to pre pregnancy levels(27,28). Sexual dysfunction is known from studies using the Female Sexual Function Index (FSFI), and prospective cross sectional interviews, to be prominent in pregnancy and may continue into the postpartum period(7,21). The sexual function index evaluates desire, arousal, lubrication, pain, orgasm, satisfaction. Dysfunction goes up in the third trimester up to 56.8% in primiparae, and 52.1% in multiparae(21).The general decline in sexual activity is most marked in the third trimester(4,21,29,28) where it can go as low as 50%(1). A qualitative

study in Taiwan showed that 64.5% of women in the third trimester had no coitus they however did not pick a specific gestational week for the study. In a cross-sectional study done in Kenya, about 60% of women reported that they had sexual activity in the third trimester which was noted as above 28weeks. This study did not evaluate any effect of this sexual activity on pregnancy outcomes(13).

Psychologically, a pregnant woman's attractiveness as perceived by herself and her partner correlates positively to coital activity and sexual enjoyment(4). Physically, her body changes and hormonal changes may affect her response to sexual advances from her partner. Hormonal changes such as increased oestrogen, progesterone and prolactin, cause nausea, breast tenderness which is associated with fatigue, weakness exhaustion and anxiety all play a role in reducing desire and arousal in sexual life(4, 30). Relaxin causes enlarged epithelial cells in the vagina and increased vaginal lumen which may reduce sensitivity and therefore the pleasure of sexual activity in pregnancy(31). The physiological and physical changes that occur during each trimester have a significant effect on women's sexual behaviour. Issues like breast tenderness, nausea, dyspareunia, urinary frequency and urgency, and abdominal discomfort are prominent in the first trimester(32,33). Studies show that in many women in the third trimester, the frequency of sexual contact, sexual desire, and satisfaction decrease significantly due to physical discomfort, fatigue, urinary frequency and urgency, vasocongestion and negative body image(32,33,34). This may continue into the postpartum period(35). These changes in maternal physiology, physique and psychology, may influence the woman's ability or enthusiasm to participate in sexual activity in the last two weeks of pregnancy.

In a Kenyan cross-sectional study, out of those who had coitus in pregnancy, 60.3% of patients had coitus about 1-3 times a week in the third trimester which was considered above 28weeks gestation in this study. A study by Omar et al in Malaysia showed 62% of

patients engage in coitus in the third trimester, 40% engage in coitus in the last two weeks and 17% in the last two days of pregnancy (10). In this study, the participants were recruited at 35-36 weeks pregnancy. Younger women were noted to have a higher frequency of sexual intercourse generally despite the overall decline(23,30). Adnima's study on Nigerian pregnant women's knowledge attitude and practises as regards sexual intercourse during pregnancy showed a positive attitude of women towards sexuality in pregnancy(7). These studies investigated the presence of sexual activity in pregnancy, but not the possibility of the effect it may have on the pregnancy outcomes.

Sexual intercourse was in the past, thought to have an effect on spontaneous onset of labour due to prostaglandin E in human semen, and from breast stimulation and/or female orgasm which is known to cause release of oxytocin(1,14). A prospective cohort study, which evaluated the impact of sexual activity after 37weeks, showed sexual intercourse at term is not associated with ripening of the cervix and does not hasten labour(1,11).However a prospective study on effect of coitus at term on pregnancy, showed that sexual activity from 36 weeks of pregnancy was associated with earlier onset of labour and reduced requirement for induction(20). This raised a controversy as to the true effect of coitus on pregnancy. The same author, carried out a randomised study, that contradicted the earlier study, showing that, coitus at term is not associated with earlier onset of labour(18). In this study, the participants were recruited in the third trimester in week 35-38 of pregnancy. The participants were among those requiring non-urgent induction of labour, and were randomised into two groups one encouraged to have sexual intercourse and the other not encouraged or discouraged and data was collected using a diary. This randomised study also showed that women who engaged in sexual intercourse had fewer episodes of spontaneous labour (18). In this study however, there was no difference between the group advised on sexual intercourse and the group that was not

encouraged to have sexual intercourse in terms of onset of labour. There was not much difference between the medians of episodes of sexual activity between the two groups at 2 times a week for those not encouraged to have intercourse versus 3 times a week for those advised on sexual intercourse. This is a prominent issue in the research on sexual activity in that the selected patients cannot be discouraged from having coitus in pregnancy. Even though they are not encouraged to have sexual intercourse, the patients must be informed that sexual activity is not contraindicated in non-high risk pregnancy. This would made it difficult to show a significant difference between the two groups (10). This study mainly investigated the onset of but not all the characteristics of labour like duration of labour and investigation was done from earlier in the third trimester at 35-38 weeks.

There is currently no strong evidence of increased pregnancy complications associated with sex in pregnancy(36). However, sexual activity in pregnancy is discouraged in cases of excessive vaginal bleeding, and placenta praevia, premature cervical dilatation, rupture of membranes, multiple pregnancy, and history of premature delivery(19).

Even with these contraindications, the true effect of sexual activity is not known. A study done on the safety of trans-vaginal ultrasounds in women with placenta praevia showed that it is safe to perform trans-vaginal ultrasonography in pregnancy. (37). This study however was concerned with the angle at which the ultrasound probe would touch the cervix. It can therefore not be used to make inferences on actual penile vaginal penetration, but raises the question on the presumption of sexual intercourse causing post-coital and/or dangerous bleeding in patients with placenta praevia. However, use of trans-vaginal ultrasound was not documented to result in any of the physiological changes associated with sexual activity. Patients who have cervical insufficiency are advised to restrict intercourse, but there is no evidence of improved outcome, with abstinence(36).

This raises questions about restriction of sexual intercourse in women with cervical insufficiency. The restriction of sexual intercourse is considered a benign recommendation due to possible consequences to pregnancies complicated by cervical insufficiency and placenta praevia.

In women with multiple pregnancy there is no difference in time of delivery (preterm or term) in those who were sexually active versus those who were not sexually active(38) so abstinence is not advised routinely. This was inferred from a prospective cohort study that evaluated women's sexual activity in the third trimester. About 24% were sexually active at 36 weeks and there was no difference in time of delivery for those engaging in sexual intercourse as compared to those abstaining. The exact timing of the sexual contact to length of time to delivery was not reported (38).

Studies have also found that risk of recurrent preterm delivery is associated with the total number of sexual partners in a woman's life and not the frequency of sexual intercourse during the current pregnancy. This was a multi-centre observational study that recruited women at elevated risk of pre-term delivery. Data on the total number of sexual partners the participants had, and sexual history in the four weeks preceding delivery was obtained. Those engaging in sexual activity showed a higher incidence of preterm delivery 38% as compared to those who abstained 28%.This implies that sexual intercourse in those at risk of preterm delivery increases the chance of preterm delivery(39). Intercourse during late pregnancy, however, has also been shown to be associated with reduced risk of pre-term delivery in a prospective cohort study where women were recruited randomly at 26 to 29 weeks from the antenatal clinic, and interviewed on their sexual activities(12).

The main problems associated with sexual activity in pregnancy that give rise to complications like infections. Initially pregnancy was thought to be protective of women

from pelvic infections due to the barrier effect of the thick mucus plug and the pregnancy itself. Acquavella et al found in their study (a retrospective study where medical records were analysed using major criteria of symptoms and lab tests) that pelvic inflammatory disease and pregnancy can coexist and therefore needs to be considered in patients especially adolescents with abdominal pain in pregnancy(40).

Medical attention is necessary after sexual activity, if bleeding or spotting continues for several days or is accompanied by clots and abdominal cramping. Large investigations have found no overall association between sexual activity and either foetal distress or perinatal mortality in a metaanalysis of multiple studies done for a textbook for women's sexuality, and no effect on Apgar score at five minutes, or cord arterial blood pH from a randomised control trial (10, 33).

In 2001, a case control study to investigate the risk of pre-term delivery in those who engaged in sexual activity in pregnancy showed reduced risk of pre-term delivery in these patients especially for those who had a recent orgasm(12).

In terms of prognosis of labour, a prospective cohort study done in Cameroon recruited 72 women who had unprotected heterosexual intercourse after 37 weeks and showed, that those who were sexually active in the last trimester of pregnancy showed statistically significant admission in active phase of labour, shorter active phase and second stage of labour, normal pattern of labour, higher spontaneous deliveries, lower caesarean section rates and less need for oxytocin(11). A similar result was found in an Iranian study where a cross sectional study was done on women in labour who had sexual intercourse in the last week of pregnancy(41). This implies there is benefit of sexual activity in the last trimester to pregnancy outcomes; however, the timing of this sexual activity is not well

elucidated. The physiological effects of sexual activity are known to be short-lived, thus the focus of this study on the last two weeks of pregnancy.

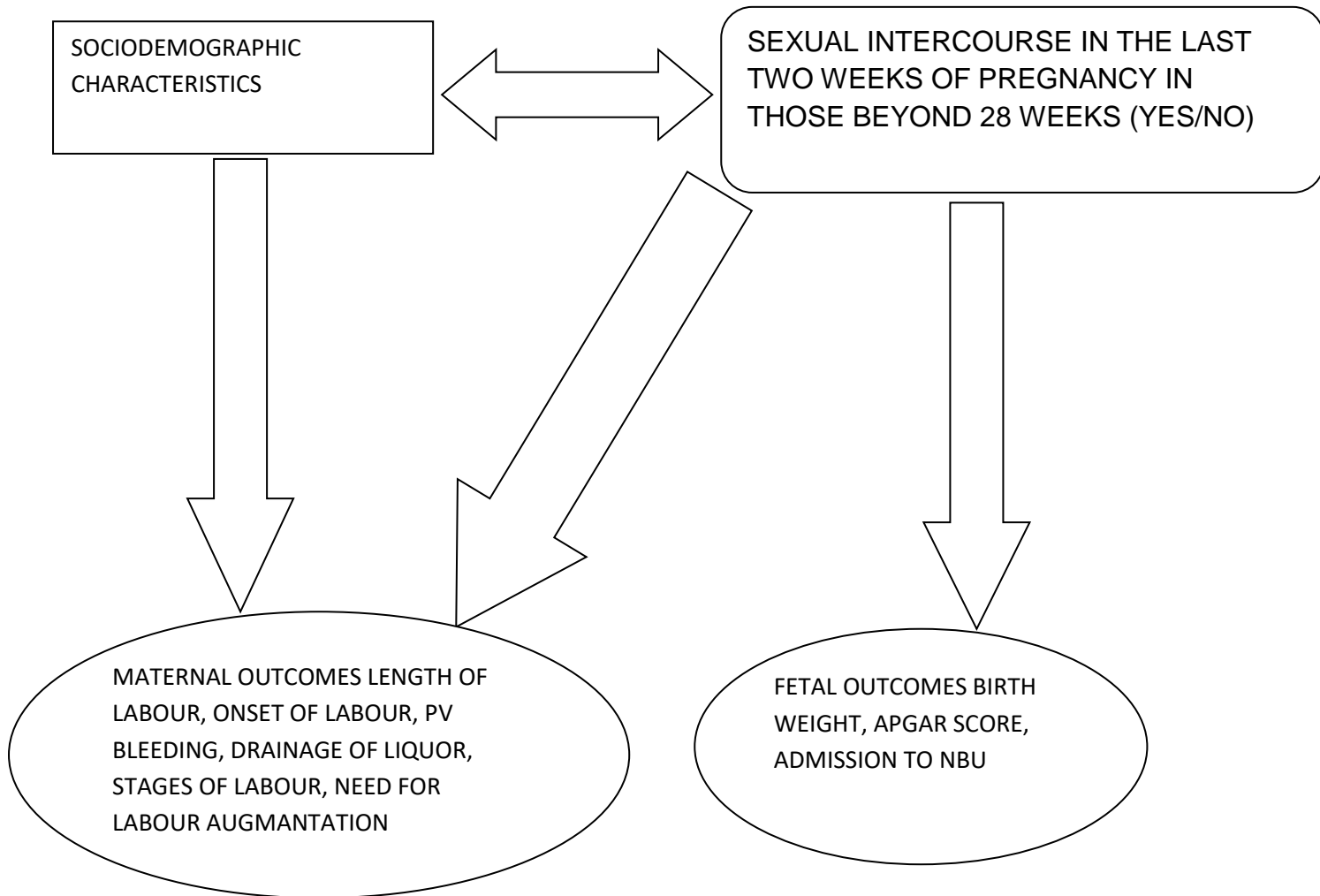
Studies show that women would like to discuss sexual activity in pregnancy with their healthcare providers but do not get the opportunity(6,23, 26). In a study carried out in Kenya, 83.8% of women wished to discuss the topic of sex with their health care provider but only 66.8% discussed it. About 95.6% had discussed this with their spouses who played the major role in their knowledge(13).

Medical personnel reticence stems from both their own discomfort with the topic and from lack of extensive conclusive data about the effects of coitus and orgasm on pregnancy. Holtzman, in her study noted that information about coitus was poorly relayed to patients(25). This discomfort has not changed much over time and is also noted in Kenya and other studies from around the world. In the absence of specific physician instructions about this frequently misunderstood aspect of pregnancy, patients must rely on anecdotes, old wives tales, and other unreliable sources of information(33). Unless physicians are familiar with scientific data, the potential for giving the inaccurate information is great. It is only with a greater knowledge base that healthcare providers can decrease their own anxiety about sexual matters and therefore aid the patient and her sexual partner in dealing with this potentially sensitive topic(33).

Apart from the possible effects of sexual activity on pregnancy, the time (two weeks) mentioned in this study gives a new outlook on the time factor association of sexual activity and onset of labour. This study provides additional information on the possibility that sexual activity in the last two weeks of pregnancy may influence pregnancy outcomes.

Sexual health during pregnancy, child birth and postpartum is being recognised as an important part of women's lives and therefore an important part of maternity services provision that cannot be ignored. The right to information and education on sexual matters falls under the sexual rights as determined and advocated by the WHO(2).

CONCEPTUAL FRAMEWORK



This framework indicates that the study is concerned with the association of sexual activity in the last two weeks of pregnancy and outcomes of pregnancy. The outcome variables are both foetal and maternal and are listed above. The outcomes both foetal and maternal can be influenced by sociodemographic factors. Similar parameters will be measured for both groups and then compared to check for differences.

JUSTIFICATION

It is important to have adequate knowledge of possible effects of sexual activity in pregnancy in local population before advising medical personnel on giving information on the same. This will assist them to use scientific evidence in decision making.

The sexual practices of pregnant women in urban areas in Kenya are generally unknown. The population in Nairobi is a mixed population from various parts of the country influenced by various cultures, religious and personal beliefs, and societal norms. Due to this it is likely that there are mixed beliefs and practices on sexual intercourse in pregnancy which need to be investigated.

Kenya has a predominantly Christian population, which generally frowns upon premarital sexual intercourse, but intercourse within the confines of marriage is not well elucidated and it is left to the couple to determine. There are no Kenyan studies on the association of sexual intercourse and pregnancy outcomes. There is a cross-sectional study that was done in Kirinyaga that showed that about 60% of women attending antenatal clinic were having intercourse in the third trimester (considered as 28 weeks and above). However, this study only evaluated frequency of sexual intercourse and not whether this activity influenced pregnancy outcomes.

It is still not clear if there is an association between sexual activity in pregnancy and pregnancy outcomes. This is because some studies show an improvement in outcomes while others show no change. The studies that show an improvement may be over estimating the effect of sexual activity as the sample sizes were smaller.

This study determines if there is an association between sexual activity in the last two weeks of pregnancy and pregnancy outcomes. The study considers, the last episode of sexual activity, the onset of labour, as well as measuring the labour outcomes such as onset (spontaneous or induced), duration, rupture of membranes, and use of augmentation. The

emotional state of the patients was also evaluated, because even though coitus may have short-lived physical effects, it may have a longer effect on the mood of the patient. This has not been evaluated on any of the studies done on outcomes of sexual intercourse in pregnancy. The fact that this study is retrospective helps to prevent the bias created by a randomised study where sexual activity cannot be discouraged, the participants will either have had sexual activity or not. The other studies done that examined sexual activity collected data in the third trimester and its effects on pregnancy outcomes taking data from 35 weeks and 37weeks gestation. This means they only evaluated term pregnancies. Evaluation of the effect of coitus after delivery, even at 28 weeks, may give information not already know about the effect of sexual intercourse on pregnancy at certain gestational ages.

Studying coitus will help to give local data on sexual practices, and outcomes of pregnancy and enable local medical personnel to determine whether to encourage sexual intercourse, discourage, or not intervene in the sexual activity of patients. The study will give medical personnel, the appropriate information to determine the right advice to give their patients. This is important as the right to information is embedded in the current constitution, and sexual health forms an integral part of reproductive health.

RESEARCH QUESTION

Is sexual activity in the last two weeks of pregnancy related to adverse pregnancy outcomes among women above 28 weeks gestation who deliver at the Kenyatta National Hospital?

NULL HYPOTHESIS

Sexual activity in pregnancy in the last two weeks of pregnancy is not associated with adverse pregnancy outcomes.

OBJECTIVE

General

To determine the relationship between sexual activity in the last two weeks of pregnancy beyond 28 weeks, and pregnancy outcomes in women at Kenyatta National Hospital postnatal wards.

Specific

- To determine the association of sexual activity in the last two weeks of pregnancy beyond 28 weeks and the onset and progress of labour.
- To determine the association between sexual activity in the last two weeks of pregnancy beyond 28 weeks and foetal outcomes including APGAR score and NICU admission.
- To determine socio-demographic characteristics of the study participants.

METHODOLOGY

Study design

This is a comparative cross-sectional study that compared pregnancy outcomes in women who engaged and those who did not engage in sexual intercourse in the final two weeks of pregnancy. It was carried out among women who had delivered in labour ward of Kenyatta National Hospital and were recruited from the postnatal wards. One hundred and eighty women who had engaged in sexual activity and an equal 180 who had not engaged in sexual activity in the last two weeks of pregnancy were identified and their pregnancy outcomes determined. They were randomly selected after delivery, from all the women who came to Kenyatta National Hospital to deliver their babies. This was hoped to ensure that we

got information about the process of their labour as well as the outcomes of labour from their medical records.

Maternal pregnancy outcomes included term/ preterm labour, type/ mode of onset of labour, cervical dilatation at admission, any bleeding and or drainage of liquor, colour of liquor, smell of liquor, need for augmentation, mode of delivery, duration and any complications of the stages of labour. Foetal and neonatal outcomes included foetal status during labour, Apgar score, birth weight, and admissions to nursery.

Setting

This study was carried out in the postnatal wards at the Kenyatta National Hospital. This hospital is a national referral and teaching hospital, with a total bed capacity of 1800 beds. It is the oldest hospital in Kenya established in 1901. It is located at the Upper hill section in Nairobi County, which offers a central position easily accessible by road thorough public or private transport. There is a vibrant maternity unit in the hospital that offers antenatal, intrapartum and postnatal care. There is also a new born unit and a neonatal intensive care unit. Patients come from other institutions that refer them due to complicated pregnancy, labour/ delivery. The patients seen here are also those who choose the centre as an appropriate place for them to deliver their babies without complication. After delivery, mothers are given food, rest and hygiene facilities for about two to four hours in the labour ward before transfer to the postnatal wards. The postnatal wards are GFA, GFB and 1A.

Study Population

The population comprises postnatal women, who came to the Kenyatta National Hospital to deliver their babies. The socio-economic status of the patients attended to ranges from low to middle income. This gave a wide range of patients who came from the hospitals catchment area including but not limited to all parts of Nairobi City and its environs. It is

noteworthy that KNH is a National referral hospital, and there is a government directive of free maternal care.

All women who presented with viable pregnancies i.e. those above 28 weeks in labour and delivered their babies at the maternity unit of the Kenyatta National Hospital were considered. Recruitment of the participants was done by randomly selecting those who fit the inclusion criteria. The potential participants were informed about the study and its purpose, importance, as well as the fact that it may cause embarrassment. Those who agreed to participate were asked to sign a comprehensive consent form. They were then asked about their sexual activity and assigned accordingly as data was collected. This was done till the target number for both groups was reached.

Inclusion Criteria

Women, who presented with pregnancies of 28weeks and above and delivered their babies at the Kenyatta National hospital, were randomly selected postnatally into the exposure group and the non-exposed group. These women had low risk pregnancies and no contraindication to sexual activity in pregnancy. They did not have planned caesarean sections, but may have gone through emergency caesarean section. The two groups comprised of women who had sexual intercourse in the last two weeks of pregnancy and those not engaging in sexual intercourse in the last two weeks of pregnancy. Data on secondary exposures, including socio-demographic data, obstetric data, and labour progress and outcomes was collected for both groups

Exclusion Criteria

Those excluded were those who declined to take part in the study, those who did not deliver their babies at the Kenyatta National Hospital, and those who were asked not to engage in sexual activity during their pregnancy. Women who had pregnancies complicated by chronic

illnesses were also excluded. Those who engaged in sexual activity using 'sex toys' or gadgets or condoms, were excluded. Those who had a birth plan for planned caesarean section were excluded from the study. Women who were postnatal but presented with pregnancies less than 28 weeks gestation were also be excluded.

Sample size

Sample size was calculated using the Fleiss formula (Fleiss 1981)(42) for comparing exposures in cohort studies:

$$n = \{p_A(1-p_A) + p_B(1-p_B)\} * 2\{(Z_{1-\alpha/2} + Z_{1-\beta})^2\} / (p_A - p_B)^2$$

Where n = number of mothers in each exposure group

Z_{β} =0.84 for 80% power level and type II error probability of 20%

Z_{α} =1.96 representing standard normal deviate for two-tailed test based on alpha level (for 0.05 significance level)

p_A = The proportion in the non-exposed group with poor maternal outcomes (estimated at 5%)

p_B = The proportion in the exposed group with poor maternal outcomes (estimated at 14 %)

$$n = \{0.05(1-0.05) + 0.14(1-0.14)\} * 2\{(1.96 + 0.84)^2\} / (0.05 - 0.14)^2$$

n = 163 mothers per group

Sample size increased by 10% to cater for missing data on pregnancy outcomes gives 180 women per group.

Therefore, total sample size =360 women participants

Data collection

Practice scenarios were conducted using role play for interviews and pilot medical records for information to be obtained from patient clinical records to reinforce the ideas introduced during the training sessions. This was done before the actual collection of data. Women, who fit the inclusion criteria, accepted to participate and sign the consent forms were recruited to take part in the study. They were given the questionnaire and their medical

records were reviewed to access the labour data. The research assistant who interviewed the patient did not collect data from the respective patient's records, so as to introduce blinding and improve the validity of the results obtained. The principal investigator supervised all data collection and inspected all completed data collection forms for missing information and validity of responses.

Variables

The dependent variable in the study is pregnancy outcomes of labour processes and neonatal status. This variable was a composite measure comprising labour processes such as term or preterm labour, mode of onset of labour, duration of labour, need for augmentation, and spontaneous/artificial rupture of membranes, clear liquor or meconium stained, features of infection, mode of delivery, among others. Neonatal status included APGAR score at five minutes, birth weight, foetal distress/ admission to newborn unit.

The independent variable in the study included socio-demographic data like age educational level, occupation, marital status, living arrangement with partner and sexual activity in pregnancy.

Complications in pregnancy like history of bleeding or infection (vaginal discharge), premature drainage of liquor were also recorded.

Data sources

Following provision of adequate information about the study to those who fit the inclusion criteria and consent form the participant, data was obtained from two sources: patient interviews using questionnaires and medical records. Questionnaires were administered to patients to obtain the socio-demographic data, and self reported data on involvement in sexual intercourse during the final two weeks of pregnancy. Data on characteristics of labour and delivery outcomes was obtained from the medical records of the participants. Data was

obtained by two research assistants. In a secluded setting the questionnaire was administered with the attendance of one research assistant to resolve any unclear issues. The other research assistant collected data from the patients file.

The information received was be kept confidential in sealed envelopes after collection and stored in a locked bag next to the research assistant for transport to the point of data entry.

Ethical considerations

The study went through the Ethical Research Review Committee of Kenyatta National Hospital and University of Nairobi for approval before initiation. Authorisation was sought from the Kenyatta national Hospital administration before initiation of the study. Informed consent was obtained from all participants before enrolment in the study, by signing of consent forms. The participants were informed of the fact that their participation or non-participation in the study would not influence their treatment in the hospital. No monetary incentives were offered to participants.

The mothers were informed that no direct objectionable effects are anticipated from participation. To protect the patients from distress during the delivery process, data collection was timed to periods when the mothers were not in labour and had adequate rest. The comfort of the mothers and the newborn was ensured during the interview process and interviews were brief and concise to give mothers adequate time to rest.

Data management

Data quality control and assurance measures were implemented at various stages to ensure the validity and integrity of data used in the final analysis. Prior to data collection the research assistant was trained by the principal investigator on the aims of the study and approaches to conducting an effective patient interview. The research assistant was also

introduced to the data collection tools and trained on the valid responses to each item in the data collection tools.

All data was entered in password secured computer databases. The databases were designed with checks for ranges, validity and consistency of data to minimize data entry errors. Data cleaning was conducted in SPSS through inspecting each variable for outlying or invalid values as appropriate and inspecting ranges and means for continuous variables.

Data analysis

Data analysis was conducted using SPSS version 18, and proceeded in three stages: univariate descriptive, bivariate and multivariable analysis. During the initial descriptive analysis, each variable in the database was analysed in turn. For continuous data including age and duration of labour, mean and standard deviation was calculated.

Frequency distribution tables were used to summarise the categorical variables (e.g. marital status, occupation, and level of education). The primary outcomes were calculated as the percentage of mothers with poor pregnancy outcomes, comprising both neonatal and maternal outcomes.

The association of sexual activity in the last two weeks of pregnancy and the labour processes and neonatal status were determined using odds ratios. A p-value of less than 0.05 was used to determine significance level of association. An odds ratio (OR) and corresponding 95% CI was calculated for the association between sexual activity and labour processes and neonatal status. T-tests and ANOVA were used to compare the mean for continuous outcomes (e.g. duration for various stages of labour) among the two groups of women having sexual intercourse or abstaining during the final two weeks of pregnancy. A mean difference and 95% CI was used to compare the two groups. When continuous

variables with a skewed distribution were found, ranks of observations in the two groups (sexual intercourse or abstinence) were compared using Wilcoxon-Mann Whitney test.

Finally, all exposure factors that were significantly associated with pregnancy outcomes in the bivariate analysis were included in the independent predictors of pregnancy outcomes. The coefficients from the regression models were reported as Odds Ratio with the corresponding 95% confidence intervals. Statistical significance in this model was based on an alpha level of 0.05.

Study limitations

Issues of data recording may have arisen, recall bias from patients, untruthful responses, and refusal to answer due to embarrassment. To overcome these biases the research assistant was trained on effective interviewing techniques, the recall period was limited to events occurring within two weeks of delivery and interviews were conducted as soon as is practical (once the mothers were not in pain and have recovered from the birth process), in a secluded area. There was involvement of the counsellor for women with adverse pregnancy outcomes to help with coping strategies. It may have been difficult to ascertain the gestational age, but for purposes of this study, the use of the last menstrual period and/or a first trimester or early second trimester ultrasound was used. It is of note that the male partner is excluded from the study and this may create further bias.

The generalizability of the findings is influenced by the type of institution selected as the study centre as there may be a larger number of patients with complicated pregnancies seen in a teaching and referral hospital. A comparison of the outcomes of referred and non-referred patients was conducted to determine the extent to which type of patients presenting to hospital threatens the generalisation of findings.

In common with other retrospective studies that utilize data from medical records the problem of missing data and incomplete documentation of delivery information in medical records was anticipated. In response to this threat, the level of completeness of data in the maternity records unit was evaluated in a pilot study to ensure that available data is of adequate quality to support the analysis. The sample size was also increased by 10% to counter this bias.

RESULTS

The study recruited a total of 360 mothers who presented at KNH with pregnancies at 28 weeks' gestation or above and were delivered at KNH. Of these women 180 reported that they had engaged in sexual intercourse in the last two weeks of pregnancy preceding delivery and 180 indicated that they did not engage in intercourse during the period.

Table 1: Sociodemographic and obstetric data of participating mothers

	Sexual activity in 2 weeks preceding delivery		OR (95% CI)	P
	Yes	No		
Age				
<20 years	5(2.8)	16(8.9)		
20-24 years	53(29.4)	56(31.1)	3.03(1.04-8.85)	0.043
25-29 years	59(32.8)	54(30.0)	3.50(1.20-10.19)	0.022
30 years and above	63(35.0)	54(30.0)	3.73(1.28-10.86)	0.016
Parity				
Primigravida	36(20.0)	37(20.6)		
Para 1-2	103(57.2)	114(63.3)	0.93(0.55-1.58)	0.784
Para 3 -5	39(21.7)	29(16.1)	1.38(0.71-2.69)	0.34
Number of living children				
1 child	32(17.8)	57(31.7)		
2 children	43(23.9)	37(20.6)	2.07(1.12-3.84)	0.021
3 or more children	38(21.1)	25(13.9)	2.71(1.39-5.26)	0.003

Table 1 showing the sociodemographic and obstetric characteristics of these women indicates that women aged below 20 were least likely to engage in intercourse in the final weeks of pregnancy compared to older women: 20-24 years (OR = 3.03, 95% CI 1.04-8.85; p = 0.043), 25-29 years (OR = 3.5, 95% CI 1.2-10.19; p = 0.022) and 30 or more years (OR 3.73, 95% CI 1.28-10.86; p = 0.016).

Mothers who had more than one living child were more likely to report engaging in sexual intercourse (2 children; OR = 2.07, 95% CI 1.12-3.84; and 3 or more children 2.71, 95% CI 1.99-5.26) compared to those with a single living child. (**Table 1**)

Table 2: Socioeconomic characteristics of participating mothers

	Sexual activity in weeks preceding delivery		OR (95% CI)	P
	Yes	No		
Education				
Primary education	53(29.4)	50(27.8)		
Secondary education	81(45.0)	77(42.8)	0.99(0.60-1.63)	0.976
Tertiary education	42(23.3)	50(27.8)	0.79(0.45-1.39)	0.419
Others	3(1.7)	1(0.6)	2.83(0.28-28.11)	0.374
Occupation				
Housewife	79(43.9)	81(45.0)		
Small business	60(33.3)	49(27.2)	1.26(0.77-2.05)	0.361
Office worker	18(10.0)	20(11.1)	0.92(0.45-1.87)	0.824
Others	21(11.7)	30(16.7)	0.72(0.38-1.36)	0.308
Marital status				
Married	175(97.2)	127(70.6)		
Single	5(2.8)	49(27.2)	0.07(0.03-0.19)	<0.001
Living arrangement				
With partner	174(96.7)	125(69.4)		
Alone	2(1.1)	25(13.9)	0.06(0.01-0.25)	<0.001
Other	3(1.7)	23(12.8)	0.09(0.03-0.32)	<0.001

Marital status and living arrangement were significantly associated with sexual activity in the period preceding delivery (p < 0.001). Single women were significantly less likely to

engage in sexual intercourse compared to married women (OR = 0.07, 0.03-0.19). Women who lived alone (OR = 0.06, 0.01-0.25) or reported other living arrangements (OR = 0.09, 0.03-0.32) were also less likely to report having intercourse prior to delivery. Maternal education and occupation did not show significant association with sexual activity ($p > 0.05$).

Table 3: Gestational age and engagement in sexual intercourse

	Sexual activity at any time in pregnancy		OR (95% CI)	P
	Yes	No		
Gestation of pregnancy at delivery				
28-32 weeks	11(6.1)	5(2.8)		
33-36 weeks	6(3.3)	15(8.3)	0.18(0.04-0.75)	0.019
37 weeks and above	138(76.7)	130(72.2)	0.48(0.16-1.43)	0.188

In **Table 3**, the study also looked at whether the participants had engaged in any sexual activity at any point during the pregnancy. More women who reported sexual activity and had preterm delivery were likely to deliver at 28-32 weeks than those who denied any sexual activity (6.1% vs. 2.8% respectively). Those who denied any sexual activity during the pregnancy and had preterm delivery were likely to deliver at 33-36 weeks gestation (OR 0.18; p 0.019). It is not clear if sexual activity was a causative factor in the shorter pregnancy length from this study, as women who have preterm deliveries are more likely to remember sexual activity.

Majority of women from both groups delivered their babies after 37 weeks.

Table 4: Sexual activity during pregnancy and marital status/ living arrangement

	Sexual activity at any time in pregnancy		OR (95% CI)	P
	Yes	No		
Marital status				
Married	277(93.9)	25(38.5)		
Single	16(5.4)	38(58.5)	0.04(0.02-0.08)	<0.001
Living arrangement				
With partner	277(93.9)	22(33.8)		
Alone	11(3.7)	16(24.6)	0.05(0.02-0.13)	<0.001
Other	4(1.4)	22(33.8)	0.01(0.00-0.05)	<0.001

Among the 360 women who were interviewed, a total of 295 (81.9%) reported having had sexual intercourse at any time during the pregnancy. **Table 4** compares the likelihood of engaging in sexual intercourse according to marital status and living arrangement. Single women (OR = 0.04, 95% CI 0.02-0.08), those living alone (OR = 0.05, 0.02-0.13) and those reporting other living arrangement (OR = 0.01, 0.00-0.05) were less likely to have sexual intercourse at any time during pregnancy compare to their married counterparts or those living with a partner.

Table 5: Self-reported practices and outcomes of sexual activity in pregnancy after 28 weeks' gestation

	Frequency	Percent
Frequency of sexual intercourse in the last two weeks		
1-3 times	105	59.7
4-7 times	68	38.6
None	3	1.7
Initiator of intercourse		
Self	14	8
Partner	106	60.2

Table Contd..

	Frequency	Percent
Both partners	56	31.8
Achieved orgasm		
Yes	158	89.3
No	18	10.2
Don't know	1	0.6
Pain during intercourse	28	15.6
Breast stimulation during intercourse	88	48.9
Any bleeding after intercourse	4	2.2
Used condom during coitus	6	3.3
Drainage of fluid from vagina after intercourse	33	18.4
Any discharge of liquor during pregnancy	10	5.7
Recalled any history of vaginal discharge during pregnancy	36	20.3
Was there ejaculation?		
Yes	144	87.3
No	16	9.7
Don't know	5	3

Table 5: indicates characteristics of sexual encounters reported by 180 women who had sexual in the two-week period preceding delivery. There were 105 (59.7%) women who reported having sex between 1-3 times in the two weeks, and 106 (60.2%) reported that the partner initiated sexual intercourse. Mothers reported that orgasm was achieved in 158 (89.3%) cases and breast stimulation occurred in 88 (48.9%).

Among the mothers having intercourse late in pregnancy 33 (18.4%) reported drainage of fluid from vagina after intercourse, 10 (5.7%) reported any discharge of liquor during pregnancy and 36 (20.3%) recalled any discharge during pregnancy.

Table 6: Mean duration of labour according to maternal report of sexual activity during the two weeks preceding delivery

	Sexual activity		No sexual activity		Difference (95% CI)	P
	Mean (\pm SD)	Range	Mean (\pm SD)	Range		
Latent phase (hrs)	8.3(\pm 5.7)	1.0-24.0	7.9(\pm 4.8)	0.1-24.0	-0.5(-1.9-1.0)	0.519
Active phase (hrs)	5.4(\pm 3.0)	0.1-18.0	5.5(\pm 3.0)	0.1-18.0	0.1(-0.6-0.8)	0.69
Third stage (hrs)	0.3(\pm 1.1)	0.1-12.0	0.3(\pm 0.8)	0.0-7.0	0.0(-0.2-0.2)	0.987

Table 6 shows that there were no significant differences in the duration of labour between mothers who had sexual intercourse during the last two weeks of pregnancy and those who did not have sexual intercourse. The mean duration of latent phase (0-3cm) was 8.3(\pm 5.7) and 7.9(\pm 4.8) hours among women who had intercourse and those who did not have intercourse, respectively ($p = 0.519$). Active phase (4-10cm) lasted on average 5.4(\pm 3.0) hours in women who reported sexual intercourse compared to 5.5(\pm 3.0) hours in those who did not ($p = 0.69$). The mean duration for third stage was 0.3 hours in both groups ($p = 0.987$).

Outcome of labour

Table 7: Outcomes of first stage of labour in mothers reporting sexual intercourse in the weeks preceding delivery compared to those reporting no sexual intercourse

	Sexual activity		OR (95% CI)	P
	Yes	No		
Labour onset				
Induced	17(9.4)	19(10.6)		
Spontaneous	159(88.3)	157(87.2)	0.88(0.44-1.76)	0.725
Timing of labour onset				
Before EDD	116(64.4)	90(50.0)		
After EDD	51(28.3)	66(36.7)	1.67(1.06-2.64)	0.028
Cervical dilatation				
0-3 cms	60(33.3)	47(26.1)		
4-10 cms	112(62.2)	122(67.8)	1.39(0.88-2.20)	0.16

Table contd...

	Sexual activity		OR (95% CI)	P
	Yes	No		
Drainage of liquor at admission				
Yes	80(44.4)	84(46.7)		
No	95(52.8)	85(47.2)	0.85(0.56-1.30)	0.459
Colour of liquor				
Clear	130(72.2)	142(78.9)		
Meconium stained	44(24.4)	31(17.2)	0.65(0.38-1.08)	0.097
Bloody	3(1.7)	4(2.2)	1.22(0.27-5.56)	0.797
Vaginal bleeding on admission				
Show	98(54.4)	114(63.3)		
Others	66(36.7)	56(31.1)	0.73(0.47-1.14)	0.166
Augmentation of labour				
Yes	51(28.3)	66(36.7)		
No	115(63.9)	95(52.8)	0.64(0.40-1.01)	0.053
Features of foetal distress				
Foetal bradycardia	8(4.4)	11(6.1)		
Foetal tachycardia	19(10.6)	11(6.1)	0.42(0.13-1.36)	0.149
Biophysical profile less than 6	2(1.1)	4(2.2)	1.45(0.21-9.98)	0.703
None	5(2.8)	6(3.3)	0.87(0.20-3.90)	0.858

The outcomes of latent phase of labour are presented in **Table 7** for women who reported sexual intercourse and those who did not report sexual intercourse in the last two weeks of pregnancy. Labour induction ($p = 0.725$), cervical dilatation ($p = 0.16$), liquor drainage at admission ($p = 0.459$), and bleeding on admission ($p = 0.166$), were not significantly associated with sexual intercourse in the final weeks of pregnancy.

Similarly, there was no significant association between augmentation of labour or features of foetal distress and reported maternal sexual activity during the last two weeks of pregnancy as shown in **Table 7**. Women who reported sexual intercourse in the last two weeks of pregnancy were more likely to deliver their babies before the expected date of delivery OR 1.67 ($p 0.028$).

Table 8: Outcomes of second stage of labour in mothers reporting sexual intercourse in the weeks preceding delivery compared to those reporting no sexual intercourse

	Sexual activity		OR (95% CI)	P
	Yes	No		
Type of delivery				
Vaginal	130(72.2)	106(58.9)		
Assisted vaginal	1(0.6)	3(1.7)	0.27(0.03-2.65)	0.262
Caesarean section	44(24.4)	69(38.3)	0.52(0.33-0.82)	0.005
Vaginal delivery				
Laceration not requiring repair	19(10.6)	12(6.7)		
Tear requiring repair	45(25.0)	45(25.0)	0.63(0.27-1.45)	0.279
Episiotomy	13(7.2)	20(11.1)	0.41(0.15-1.12)	0.082
APGAR at 1 minute				
< 7	11(6.1)	18(10.0)		
>= 7	161(89.4)	157(87.2)	1.68(0.77-3.67)	0.194
APGAR at 5 minutes				
< 7	3(1.7)	11(6.1)		
>= 7	169(93.9)	164(91.1)	3.78(1.04-13.79)	0.044
Birth weight				
< 2500 g	20(11.1)	19(10.6)		
>= 2500 g	156(86.7)	157(87.2)	0.94(0.49-1.84)	0.865

APGAR scores at 1 minute ($p = 0.194$), and birth weights ($p = 0.865$) were similar for babies born to the two groups of mothers (**Table 8**). The caesarean section rate in mothers who had reported sexual activity prior to delivery was 24.4% compared to 38.3% in those who did not report sexual activity prior to delivery OR = 0.52, 95% CI 0.33-0.82; $p = 0.005$.

The risk of vaginal tears during delivery does not appear to differ between women who reported sexual intercourse in late pregnancy, and those who did not. Episiotomies were done less frequently for women who had sexual intercourse in the last two week of

pregnancy than those who did not but this difference was not clinically significant. (OR 0.41; CI, 0.15-1.12; p- 0.082).

Third stage

Table 9: Outcomes of third stage of labour in mothers reporting sexual intercourse in the weeks preceding delivery compared to those reporting no sexual intercourse

	Sexual activity		OR (95% CI)	P
	Yes	No		
Third stage				
Complicated	8(4.4)	6(3.3)		
Uncomplicated	167(92.8)	171(95.0)	0.73(0.25-2.16)	0.572
Baby admitted in nursery				
Yes	23(12.8)	27(15.0)		
No	150(83.3)	151(83.9)	1.17(0.64-2.13)	0.616

There was no significant association between the outcomes of third stage labour and maternal sexual activity in the final two weeks of pregnancy (**Table 9**). Complications occurred in 4.4 and 3.3% of babies born to mother reporting sexual activity and those not reporting activity, respectively (P = 0.572). NBU admission rates were similar at 12.8% and 15% in the two groups (p = 0.616).

Mood or affect after delivery

Table 10: Mood or affect among women during the postpartum period

	Sexual activity		OR (95% CI)	P
	Yes	No		
Mood or affect after delivery				
Happy	136(75.6)	127(70.6)		
Confused	2(1.1)	2(1.1)	0.93(0.13-6.73)	0.946
Sad	7(3.9)	8(4.4)	0.82(0.29-2.32)	0.704

Table contd....

	Sexual activity		OR (95% CI)	P
	Yes	No		
Anxious	16(8.9)	21(11.7)	0.71(0.36-1.42)	0.336
Flat	2(1.1)	10(5.6)	0.19(0.04-0.87)	0.032

There were no significant differences in the reported mood of mothers in the postpartum period depending on whether they had reported sexual activity or no sexual activity in the final two weeks of pregnancy as shown in **Table 10**. Majority of women in both groups were happy after delivery, and sexual activity appears to reduce the incidence of flat or indifferent mood.

DISCUSSION

The impact of sexual activity in the last two weeks of pregnancy was evaluated on various levels. The frequency of sexual contact in the last two weeks of pregnancy was 1-3 times a week. Similar results have been reported in a study in Kenya on frequency of sexual activity in pregnancy and a study in Nigeria(13,43).

Unlike in Malaysia where they found that younger women were more likely to engage in sexual activity, this study found that women over 30 years were three times more likely to engage in sexual intercourse(p 0.016) than their younger counterparts(10). Other studies in Iran and China also showed a reduction in sexual intercourse with increasing age(44, 45). The difference may also be associated with the fact that in Kenya, women over 30 years are likely to have 2 or more live children.

Sexual dysfunction was not specifically investigated in this study however some parameters like pain were evaluated and it was found that only 15% of respondents reported pain during intercourse. 89.3% of respondents reported that they achieved orgasm. Breast stimulation was reported in 48.9%. In terms of initiation of sexual intercourse, the respondent's partner was the initiator 60% of the time, both initiated 31.8% of the time and the respondents initiated 8% of the time. A study carried out in Pakistan also showed that the husband was the main initiator (44%), and the women initiated it 0.7% of the time. The fact that the husband was the main initiator and the women to a much less extent, was similar however, the percentages are larger in Kenya. This could be due to sample size differences of cultural differences(46). The low initiation by the women in these studies may be explained by the general reduction in desire/libido that is noted in late pregnancy.

Onset of labour (spontaneous or induced) was not significantly different in those who reported sexual intercourse in the last two weeks of pregnancy compared to those who did not. This is comparable to a study to check if sexual intercourse expedited the onset of spontaneous labour(47). However, 64.4% of women who reported sexual activity in the last two weeks of pregnancy went into labour before their expected date of delivery, compared with 50% of those who reported no sexual contact. Women who had sexual intercourse were 1.67 times more likely to go into labour before their expected date of delivery (p 0.028). This is comparable to results found in a study to evaluate whether sexual intercourse influences the length of gestation(20).

Complications in those who reported sexual activity were 2.2% for bleeding, and 5.7% for drainage of liquor and 20% for vaginal discharge in pregnancy. These low percentages

reinforce the fact that sexual activity does not on its own cause increased risk in pregnancy and are similar to a Chinese study on sexual activity in pregnancy that showed a total of 12% reporting of complications(44). This answers the research question which was to determine if sexual activity causes adverse effects.

There was no difference found between both groups in terms of requirement for augmenting of labour. This differs from a cohort study on effects of coitus on labour that reported less need for augmentation(11). Women who reported sexual activity in the last two weeks of pregnancy were less likely to have a caesarean section 24.4% vs. 38% in those who said they did not have sexual intercourse (OR 0.52 95% CI 0.33-0.82; $p=0.005$). This is similar to a study in Cameroon that showed the same effect(11). Other differences in findings include the fact that sexual intercourse did not affect the occurrence of vaginal lacerations or episiotomy. There were no significant differences between both groups in terms of length of the various stages of labour or phase of labour at presentation. This contradicted the Cameroonian study which showed a reduction in length of first stage of labour and likely presentation in active labour(11). Postnatal maternal mood was also not found to be significantly different in either group. This has not been found to have been checked in other studies.

Foetal outcomes measured were APGAR score, birth weight and admission to newborn unit. APGAR score at one minute was not found to be significant. However, APGAR score at 5 minutes was 3.78 times more likely to be above 7 in those who claimed sexual activity in the last two weeks of pregnancy ($p 0.04$). This was odd, given that the percentage of those whose mothers engaged in sexual activity (93.9%) was only slightly higher than those whose mothers reported no sexual activity (91%). A confounder is

thought to be the reason for this difference. APGAR score has not been shown to be affected by sexual activity in most studies that evaluated sexual intercourse and labour (11,47). Birth weight and admission to newborn unit were not shown to be significantly different between those who had sexual activity in the last two weeks of pregnancy and those who did not (11,47).

Regarding sociodemographic findings, the number of live children, influenced whether the respondent had sexual intercourse. Women with more than two live children were two times more likely to have sexual intercourse than a woman with one living child (p 0.021). Those with three live children were 2.71 times more likely to have sexual intercourse in the last two weeks of pregnancy (p 0.003). It is possible that this is an indication of less fear of sexual contact due to prior experience with no adverse outcomes. This was not found to have been determined in the other studies done, because they checked parity and not number of live children.

Education and occupation did not however influence the sexual activities of women in the last two weeks of pregnancy. This study showed no statistically significant difference in educational level between the two groups, which contradicts a study done in China which showed that women with lower education were less likely to engage in sexual activity (45). This implies that other factors may influence sexual activity in the last two weeks of pregnancy in Kenya.

Marital status and living arrangement were found to be determinants of sexual activity in pregnancy. 93.9% of married women reported having sexual activity in pregnancy compared to 5.4% of single women. This difference may be due to the presence of the

partner during the pregnancy, and the likely increase in initiation due to their presence. Living arrangement was not recorded in the other studies on sexual activity in pregnancy.

CONCLUSION

Sexual activity in the last two weeks of pregnancy is more likely to occur in those older than 30 years who have 2 or more live children. Sexual activity is also influenced by marital status and living arrangements. The commonest frequency of intercourse is 1-3 times per week. The occurrence of sexual activity is however not influenced by educational level or occupation.

In terms of outcomes of sexual activity in the last two weeks of pregnancy, those who engage in intercourse are 1.67 times more likely to go into labour before the expected date of delivery. Those who engage in sexual activity in the last two weeks of pregnancy may also have a reduced chance of requiring caesarean section delivery. Neonatal outcomes showed no significant difference in those who engage in sexual activity compared to those who do not.

RECOMMENDATIONS

The low occurrence of adverse effects found in this study therefore corresponds with the recommendation that sexual activity in pregnancy should not be discouraged in low risk pregnancies.

Women with low risk pregnancy should therefore be encouraged to have sexual intercourse without fear of adverse effects, and with possibility of reducing the rate of caesarean delivery.

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BUDGET

ITEM	QUANTITY	COST (Kshs)	TOTAL (Kshs)
Stationery			2,000
Printing costs		30per page	53,100
Ethics approval	1	2,000	3,000
Research assistant	2	@20,000 each	40,000
Statistician	1	30,000	30,000
Contingency			10,000
TOTAL			138,100

APPENDIX

QUESTIONNAIRE

PART A: Socio demographic data

1. Maternal (age in completed years) _____
2. Parity ____ + ____
3. Number of living children _____
4. Gestational age of pregnancy at delivery (in completed weeks) _____
5. Educational level
 - A. None
 - B. Primary education
 - C. Secondary education
 - D. Tertiary education
 - E. Other (specify) _____
6. Occupation
 - A. Housewife
 - B. Small business
 - C. Office worker
 - D. Other (specify) _____
7. Marital status
 - A. Married
 - B. Divorced
 - C. Single
 - D. Widowed
8. Living arrangements
 - A. With partner,
 - B. Alone
 - C. Other specify
9. Sexual intercourse at any time during this pregnancy
 - A. Yes
 - B. No
 - C. If no specify reason(s)
10. Sexual intercourse (penile-vaginal penetration) in the last two weeks before delivery
 - A. Yes
 - B. No
 - C. If no specify reason(s) _____
11. Number of times of sexual intercourse during the last two weeks
 - A. 1-3

- B. 4-7
- C. >=7
- D. None

12. Sexual intercourse(penile vaginal penetration) any time after 28 weeks in this pregnancy

- A. Yes
- B. No
- C. If no specify reason(s)
(fear of abortion , declining/no libido in all trimesters, fear of membrane rupture in third trimester, nausea, vomiting lack of interest, discomfort, physical awkwardness, fear of infection, fatigue)

If no go to question number 26 if yes continue

13. Initiator of intercourse

- A. Self
- B. Partner

14. Number of days between last episode of sexual intercourse and labour

- 15. Did you achieve orgasm/ satisfaction Yes No Don't know
- 16. Was there pain during intercourse Yes No
- 17. Was there breast stimulation during intercourse Yes No
- 18. Was there any bleeding after intercourse Yes No
- 19. Did you use a condom during coitus in the last two weeks Yes No
- 20. Was there drainage of fluid from vagina after intercourse Yes No
- 21. Was there any drainage of liquor during pregnancy Yes No
- 22. Do you recall any history of vaginal discharge during pregnancy Yes No
- 23. When was the last time you had intercourse (days)
- 24. Was there ejaculation Yes No Don't know

Part B: labour and labour outcomes (Information from medical records)

- 25. Duration of labour _____ Hrs _____ Days
- 26. Duration of stages of labour in hours
 - A. First stage (0-3cms)
 - B. Second stage (4-10cms)
 - C. Third stage (delivery of baby to delivery of placenta)

First Stage

- 27. Was labour induced or spontaneous (if induced, at what gestational age)
- 28. Onset of labour before on or after EDD(expected date of delivery)
- 29. Cervical dilatation at presentation/ admission _____cms
- 30. Any notation of drainage of liquor at admission Yes No

31. Colour of liquor at point of drainage
- A. Clear
 - B. Meconium stained
 - C. Bloody
 - D. Other
32. Any notation of vaginal bleeding on admission and characteristics- show, aph
- A. Show
 - B. Abruptio placenta
 - C. Placenta praevia
 - D. other
33. Any augmentation of labour instituted(usually done with syntocinon)
- Yes No
34. Any feature of foetal distress noted foetal heart, low biophysical profile
- A. foetal bradycardia
 - B. foetal tachycardia
 - C. biophysical profile less than 6

Second Stage

35. Type of delivery
- A. Vaginal
 - B. Assisted vaginal
 - C. Caesarean section
36. For vaginal delivery any tear / episiotomy done
- A. Laceration (not requiring repair)
 - B. Tear (requiring repair)
 - C. Episiotomy
37. Apgar score of baby in _____ one min _____ five min
38. Birth weight _____gms

Third stage

39. Third stage
- A. Complicated
 - i. Retained placenta
 - ii. Developed PPH
 - iii. Took longer than 30min
 - B. Uncomplicated
40. Baby admitted in nursery
- A. Yes
 - B. No

41. Altered mood or affect after delivery

- A. Happy
- B. Confused
- C. Sad
- D. Anxious
- E. Flat
- F. Other

CONSENT FORM

PARTICIPANT INFORMATION AND CONSENT FORM (ADULT CONSENT) FOR ENROLLMENT IN THE STUDY

SEXUAL ACTIVITY IN THE LAST TWO WEEKS OF PREGNANCY AND PREGNANCY OUTCOMES

Principal Investigator\and institutional affiliation:

Dr Pamela A. Muga MMed Obs/gyn university of Nairobi

Co-Investigators and institutional affiliation:

Prof P.M.Ndavi Department of Obs/gyn university of Nairobi

Dr K. Lubano Department of Obs/gyn university of Nairobi

Introduction:

I would like to tell you about a study being conducted by the above listed researchers. The purpose of this consent form is to give you the information you will need to help you decide whether or not to be a participant in the study. Feel free to ask any questions about the purpose of the research, what happens if you participate in the study, the possible risks and benefits, your rights as a volunteer, and anything else about the research or this form that is not clear. When we have answered all your questions to your satisfaction, you may decide to be in the study or not. This process is called 'informed consent'. Once you understand and agree to be in the study, I will request you to sign your name on this form. You should understand the general principles which apply to all participants in a medical research: i) Your decision to participate is entirely voluntary ii) You may withdraw from the study at any time without necessarily giving a reason for your withdrawal iii) Refusal to participate in the research will not affect the services you are entitled to in this health facility or other facilities. We will give you a copy of this form for your records.

May I continue? YES / NO

This study has approval by The Kenyatta National Hospital-University of Nairobi Ethics and Research Committee protocol No. 484/06/2016

WHAT IS THIS STUDY ABOUT?

The researchers listed above are interviewing individuals who engage and those who do not engage in sexual activity in the last two weeks of pregnancy. The purpose of the interview is to find out if you have or haven't engaged in sexual activity in the last two weeks of pregnancy. Participants in this research study will be asked questions about details of sexual activity in the last two weeks of pregnancy

There will be approximately 360 participants in this study randomly chosen. We are asking for your consent to consider participating in this study.

WHAT WILL HAPPEN IF YOU DECIDE TO BE IN THIS RESEARCH STUDY?

If you agree to participate in this study, the following things will happen:

You will be interviewed by a trained interviewer in a private area where you feel comfortable answering questions. The interview will last approximately 10 minutes. The interview will cover topics such as number of times of sexual activity

After the interview is finished we will get information from your medical records about the process of your labour and delivery

We will ask for a telephone number where we can contact you if necessary. If you agree to provide your contact information, it will be used only by people working for this study and will never be shared with others. The reasons why we may need to contact you include: to clarify the information that we get from you or to communicate the results of the study

ARE THERE ANY RISKS, HARMS DISCOMFORTS ASSOCIATED WITH THIS STUDY?

Medical research has the potential to introduce psychological, social, emotional and physical risks. Effort should always be put in place to minimize the risks. One potential risk of being in the study is loss of privacy. We will keep everything you tell us as confidential as possible. We will use a code number to identify you in a password-protected computer database and will keep all of our paper records in a locked file cabinet. However, no system of protecting your confidentiality can be absolutely secure, so it is still possible that someone could find out you were in this study and could find out information about you.

Also, answering questions in the interview may be uncomfortable for you. If there are any questions you do not want to answer, you can skip them. You have the right to refuse the interview or any questions asked during the interview.

It may be embarrassing for you to discuss this information; we will do everything we can to ensure that this is done in private. Furthermore, all study staff and interviewers are professionals with special training in these examinations/interviews.

In case of an injury, illness or complications related to this study, contact the study staff right away at the number provided at the end of this document. The study staff will treat you for minor conditions or refer you when necessary.

ARE THERE ANY BENEFITS BEING IN THIS STUDY?

You may benefit by receiving free Counseling, health information etc .We will refer you to a hospital for care and support where necessary. Also, the information you provide will help us better understand the influence of biological influences of sexual activity in the processes of labour. This information is a contribution to science and of benefit to the future of practice

WILL BEING IN THIS STUDY COST YOU ANYTHING?

It will cost you your time

WILL YOU GET REFUND FOR ANY MONEY SPENT AS PART OF THIS STUDY?

You will not be required to spend any money as part of your participation in the study.

WHAT IF YOU HAVE QUESTIONS IN FUTURE?

If you have further questions or concerns about participating in this study, please call or send a text message to the study staff at the number provided at the bottom of this page.

For more information about your rights as a research participant you may contact the Secretary/Chairperson, Kenyatta National Hospital-University of Nairobi Ethics and Research Committee Telephone No. 2726300 Ext. 44102 email uonknh_erc@uonbi.ac.ke.

The study staff will pay you back for your charges to these numbers if the call is for study-related communication.

WHAT ARE YOUR OTHER CHOICES?

Your decision to participate in research is voluntary. You are free to decline participation in the study and you can withdraw from the study at any time without injustice or loss of any benefits.

CONSENT FORM (STATEMENT OF CONSENT)

Participant’s statement

I have read this consent form or had the information read to me. I have had the chance to discuss this research study with a study counselor. I have had my questions answered in a language that I understand. The risks and benefits have been explained to me. I understand that my participation in this study is voluntary and that I may choose to withdraw any time. I freely agree to participate in this research study.

I understand that all efforts will be made to keep information regarding my personal identity confidential. By signing this consent form, I have not given up any of the legal rights that I have as a participant in a research study.

I agree to participate in this research study: Yes No

I agree to provide contact information for follow-up: Yes No

Participant signature / Thumb stamp _____ Date

Participant printed name: _____

Participant contact:

Researcher’s statement

I, the undersigned, have fully explained the relevant details of this research study to the participant named above and believe that the participant has understood and has willingly and freely given his/her consent.

Researcher’s Name: _____ Date: _____

Signature

Role in the study: _____ *[i.e. study staff who explained informed consent form.]*

For more information contact Dr Pamela A. Muga at Tel. 072289562, Email pamela.muga@outlook.com

From _____ to _____

Witness Printed Name *(If witness is necessary, A witness is a person mutually acceptable to both the researcher and participant)*

Name _____ Contact information

Signature /Thumb stamp: _____ Date;